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ADST/WDL/TR--92-03013

ADVANCED DISTRIBUTED SIMULATION TECHNOLOGY QUARTERLY REVIEW SUMMARIES

Loral Systems Company
ADST Program Office
Orlando, Florida

28 July 1992

Prepared for

STRICOM
Simulation, Training and Instrumentation Command
Orlando, Florida

LORAL
Systems Company

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ADST/WDL/TR--92-03013

ADVANCED DISTRIBUTED SIMULATION TECHNOLOGY QUARTERLY REVIEW SUMMARIES

Loral Systems Company
ADST Program Office
12443 Research Parkway Suite 303
Orlando, Florida 32826

28 July 1992

Contract No. N61339-91-D-0001

Prepared for

STRICOM
Simulation, Training and Instrumentation Command
Naval Training Systems Center
12350 Research Parkway
Orlando, Florida 32826-3275

LORAL
Systems Company

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12350 Research Parkway
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13. ABSTRACT (Maximum 200 words)

The ADST Quarterly Review Summaries provides an overview of all currently active ADST Delivery Orders (DO). In addition to a brief synopsis of the DO technical effort, project scheduling data and exit criteria are provided.

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15. NUMBER OF PAGES
70

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DELIVERY ORDER SUMMARIES

ATAC II

Sponsor/POC DCD / Joe Bowen **Phone** (205) 255-4704

STRICOM POC Bryant LaFoy **Phone** (407) 380-4353

LORAL POC Greg Kanies **Phone** (407) 382-4596

Funding Source USAAVNC

Schedule: **Start** 15 February 1992 **Stop** 26 February 1993

Project Description:

The objective of the ATAC II effort is to upgrade the capabilities of the Aviation Test Bed facility at Ft. Rucker in order to support the conduct of the Air-to-Air Combat, Phase II experimentation. This includes improvements to the existing AVTB to:

- increase the fidelity of the SAFOR detection tables
- add a Missile Server to the network to allow firing Hellfire Missiles with a remote designator
- improve the Air-to-Air Stinger symbology
- integrate a Digital Map with one of the Rotary Wing Aircraft devices
- procure and integrate a Mission Planning/Scenario Generation systems
- procure and integrate an After Action Review capability including a video instrumentation and editing system
- provide engineering, test support, and data analysis services.

Project Status:

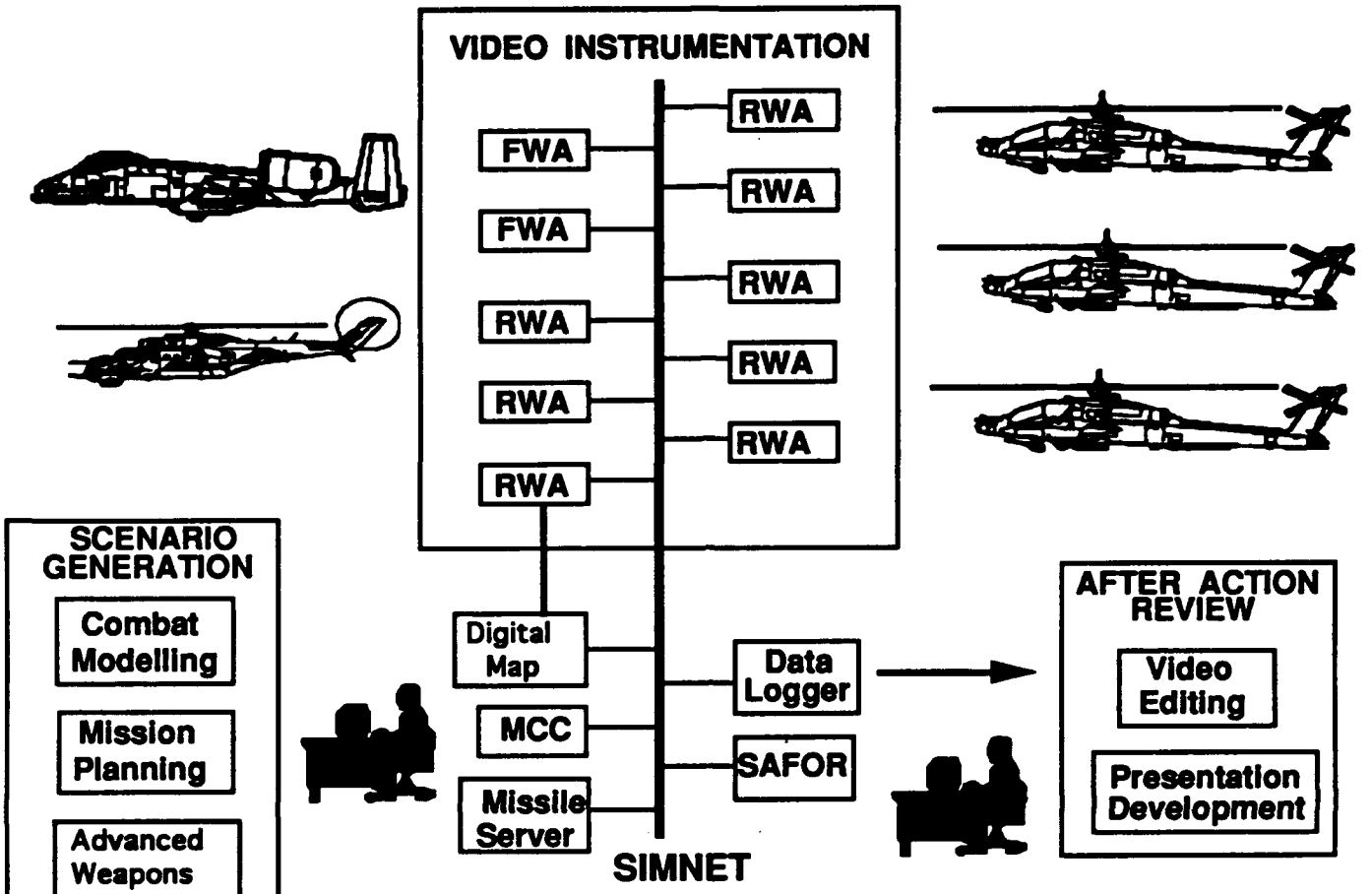
The ATAC II effort is progressing on schedule with the following exceptions.

The original supplier of the video instrumentation and editing system failed to deliver. A replacement supplier has been identified and installation and integration of the system are nearly complete.

Digital Map integration has proved more difficult than anticipated. Allied Signal is on site this week performing integration testing.

LORAL

ATAC II Configuration

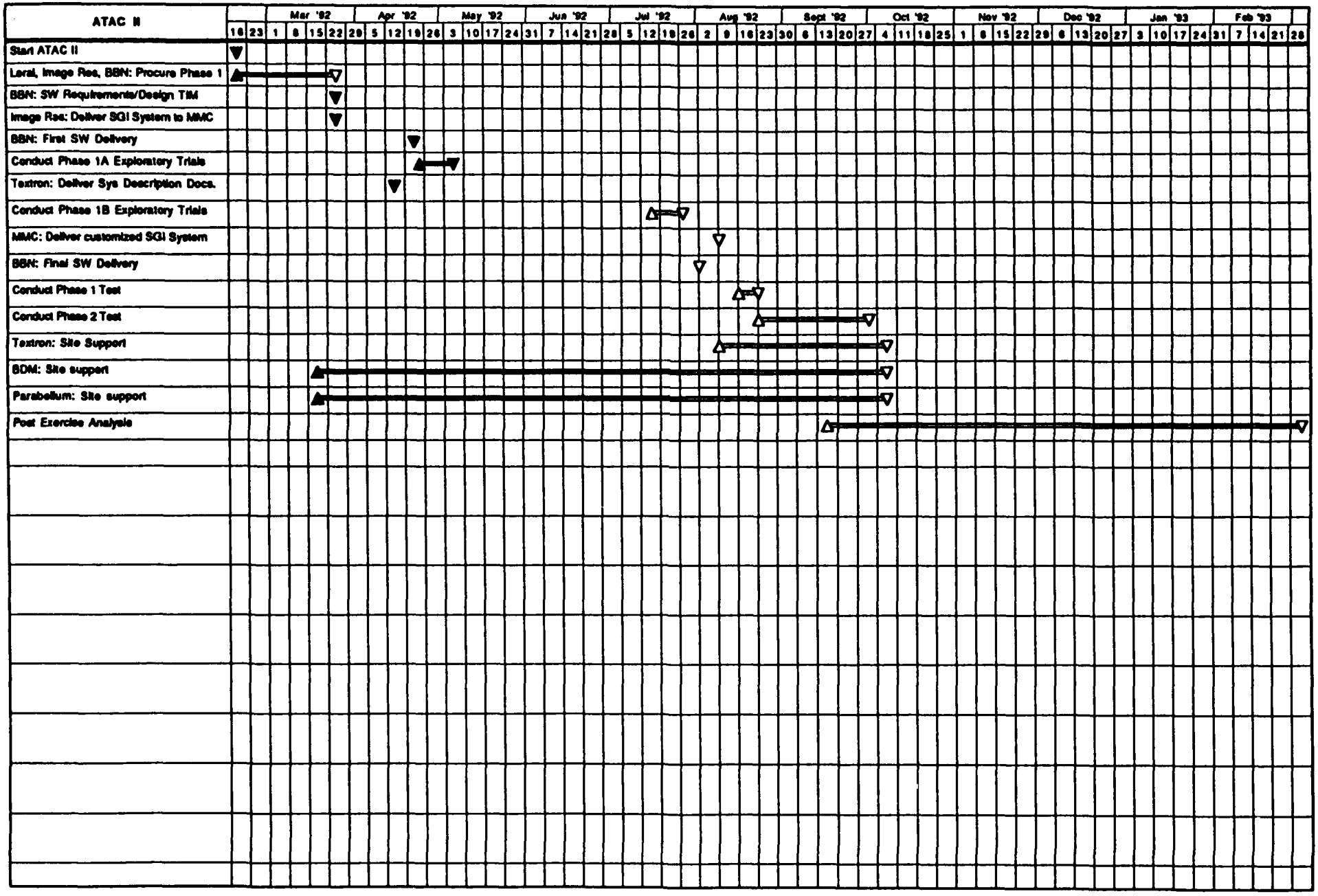


Exit Criteria or Objective

Support the conduct of the Air-to-Air Combat Phase II experiment by providing:

- **Software Upgrades to the Rotary Wing Aircraft devices**
- **Software Upgrades to the Semi-Automated Forces detection tables**
- **Digital Map**
- **Missile Server for launch of Hellfire missiles in a remote mode**
- **Scenario Generation capabilities**
- **Video Instrumentation of the Rotary and Fixed Wing Aircraft devices**
- **After Action Review capabilities**
- **Engineering, Test Support, and Data Analysis services**

LORAL


ATAC II
Mar '92
Apr '92
May '92
Jun '92
Jul '92
Aug '92
Sept '92
Oct '92
Nov '92
Dec '92
Jan '93
Feb '93
16 23 1 8 15 22 29 5 12 19 26 3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 6 13 20 27 4 11 18 25 1 8 15 22 29 6 13 20 27 3 10 17 24 31 7 14 21 28
Start ATAC II
Loral, Image Res, BBN: Procure Phase 1
BBN: SW Requirements/Design TIM
Image Res: Deliver SGI System to MMC
BBN: First SW Delivery
Conduct Phase 1A Exploratory Trials
Textron: Deliver Sys Description Docs.
Conduct Phase 1B Exploratory Trials
MMC: Deliver customized SGI System
BBN: Final SW Delivery
Conduct Phase 1 Test
Conduct Phase 2 Test
Textron: Site Support
BDM: Site support
Parabellum: Site support
Post Exercise Analysis

AirNet AeroModel & Weapons Model Conversion

Sponsor/POC	TSM-C/Major Steve Ochsner	**Phone**	(205)255-2205
STRICOM POC	Mr. Bryant LaFoy	**Phone**	(205) 380-4353
Loral DO POC	Mr. Fred Bondzeit	**Phone**	(407) 382-4585
Funding Source	STRICOM		
Schedule: **Start**	7 April 1992	**Stop**	1 February 1993

Project Description:

Provide selected enhancements to the existing 8 AirNet Rotary Wing Aircraft (RWA) simulators. Includes design, procurement, integration, and test.

Enhancements:

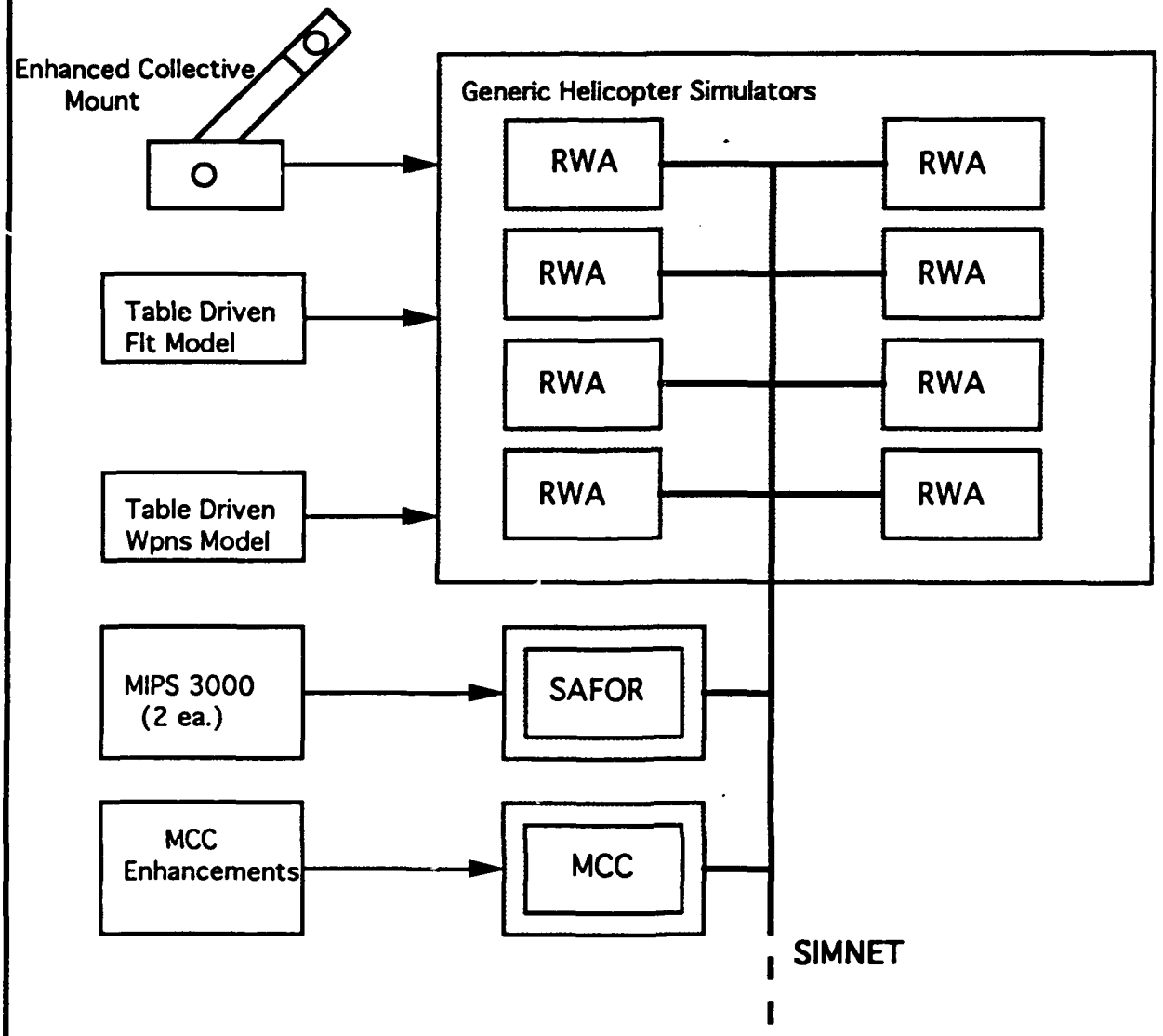
- Provide 2 additional MIPS 3000 processors for expanded SAFOR
- Replace generic flight model with a table driven flight model
- Replace generic weapons models with table driven weapons models
- Replace existing collective mount with an improved mechanism
- Enhance existing MCC to add digital message capability. Add RAH-66 related functions to manage the allocation, assignment, initialization, configuration, location, orientation, and loading of the RAH-66

Project Status:

- MIPS 3000 Computers Ordered
- System Specification Complete
- Software design 75% Complete
- Hardware Design 90% Complete
- Due to Lack of Software Baseline, MCC is Behind Schedule and Over Budget
- Recovery Plan in Place Utilizing Loral At-Risk Funding

LORAL

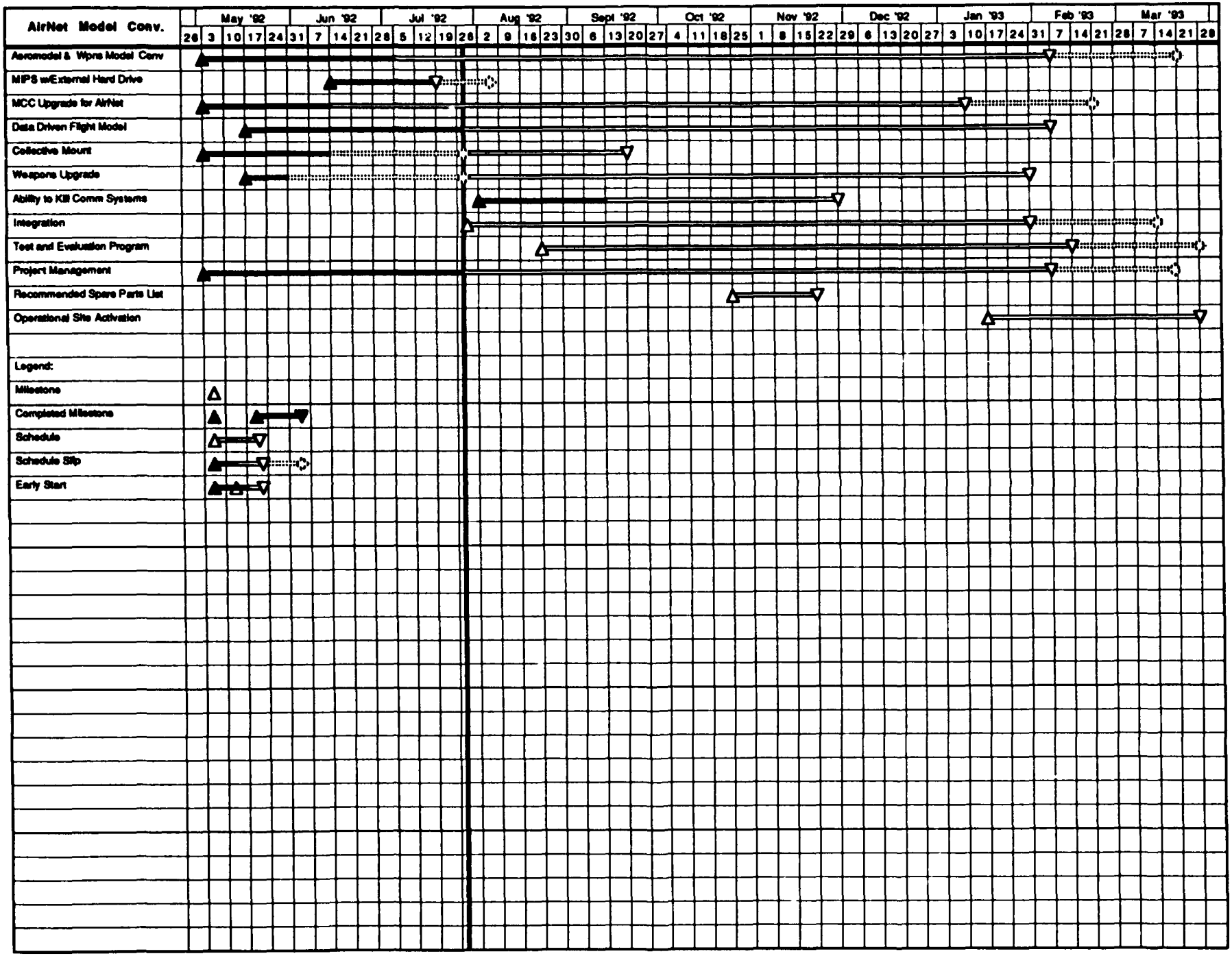
AirNet AeroModel & Weapons Model Conversion



Exit Criteria or Objective

- Provide Additional MIPS Computers for Expanded SAFOR
- Improved Combined Arms Environment Through Specific Flight and Weapons Models
- Improved Collective Mount Reliability
- Digital Message Capability to Support RAH-66 Battlefield Communications
- Add Required RAH-66 Functions to the MCC
- Modular Features Transportable to RAH-66 and Other BDS-D Simulators

LORAL


AirNet Model Conv.
May '92
Jun '92
Jul '92
Aug '92
Sept '92
Oct '92
Nov '92
Dec '92
Jan '93
Feb '93
Mar '93
26 3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 6 13 20 27 4 11 18 25 1 8 15 22 29 6 13 20 27 3 10 17 24 31 7 14 21 28 7 14 21 28
Aeromodel & Wpns Model Conv
MIPS w/External Hard Drive
MCC Upgrade for AirNet
Data Driven Flight Model
Collective Mount
Weapons Upgrade
Ability to Kill Comm Systems
Integration
Test and Evaluation Program
Project Management
Recommended Spare Parts List
Operational Site Activation
Legend:
Milestone
Completed Milestone
Schedule
Schedule Slip
Early Start

BDS-D Architecture Definition & DIS Standards Development

Sponsor/POC	STRICOM	**Phone**	
STRICOM POC	Gene Wiehagen	**Phone**	(407) 380-4363
Loral POC	Bob Ferguson	**Phone**	(407) 382-4597
Funding Source	STRICOM		
Schedule: **Start**	1 July 1992	**Stop**	30 June 1993

Project Description:

The primary objective of this project shall be the definition and development of the BDS-D Version 1.0 System, the first instantiation of a DIS compliant system containing heterogeneous simulators networked together. The BDS-D TDP ATD Exit Criteria shall be used to measure the performance of this system. Additional architecture objectives shall include but not be limited to the development of specifications and ICD's for the BDS-D Version 1.0 System, refinement and extension of the DIS reference model to other regimes such as instrumented ranges and higher order models, system analyses to quantify performance, and the development of BDS-D Compliance, Model VV&A and security procedures and methods. Standards objectives shall include but not be limited to the development of a strawman DIS common data base standard, extensions to the existing DIS message standards, and a correlation methodology to support determination of the interoperability of a network of dissimilar simulators.

This project will be performed over a one calendar year period. It is expected that a follow-on phase will be performed for another period of approximately one calendar year. This follow-on phase will be completed on or before September 30, 1994. The BDS-D Version 1.0 System will be completed by the end of the second phase. The exact definition and implementation schedule of the BDS-D Version 1.0 System will be specified via the BDS-D System Plan, a document produced by this project. This document will define the BDS-D road map including the BDS-D Version 1.0 System configuration, exit criteria including conformance criteria, operational concept, and cost-economic benefit metrics to show the value of DIS solutions to potential users. This document will be updated and reissued as needed.

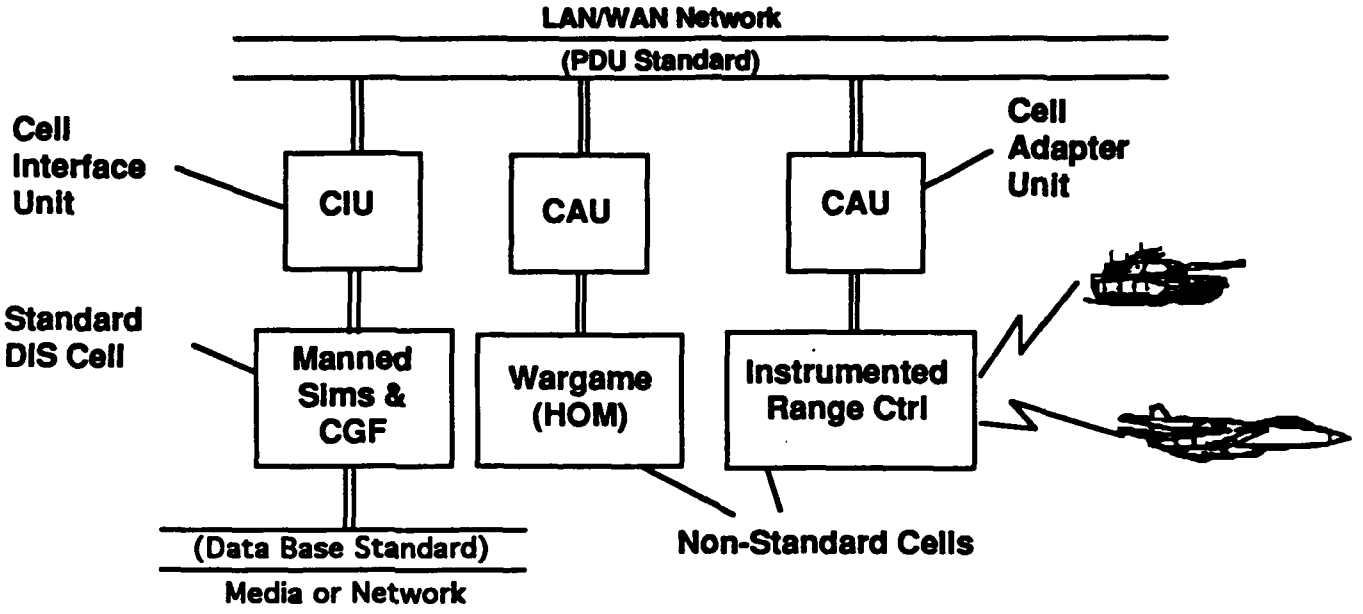
Project personnel will participate in DIS community activities including but not limited to DIS meetings and conferences, simulation and modeling standards meetings and workshops, and other forums as appropriate. The objective is to expose BDS-D architecture efforts to the DIS community at large, to encourage and facilitate standards and architecture development by the community, and to obtain feedback from these forums as well as BDS-D users.

Project Status:

Contract award was made on June 30, 1992. Initial planning was performed prior to contract award using Loral funds. The IST led correlation methodology study was kicked off. An interoperability study was initiated, with initial emphasis on the various visual systems that comprise the BDS-D Version 1.0 System. System Design and User Requirements Analyses were also initiated.

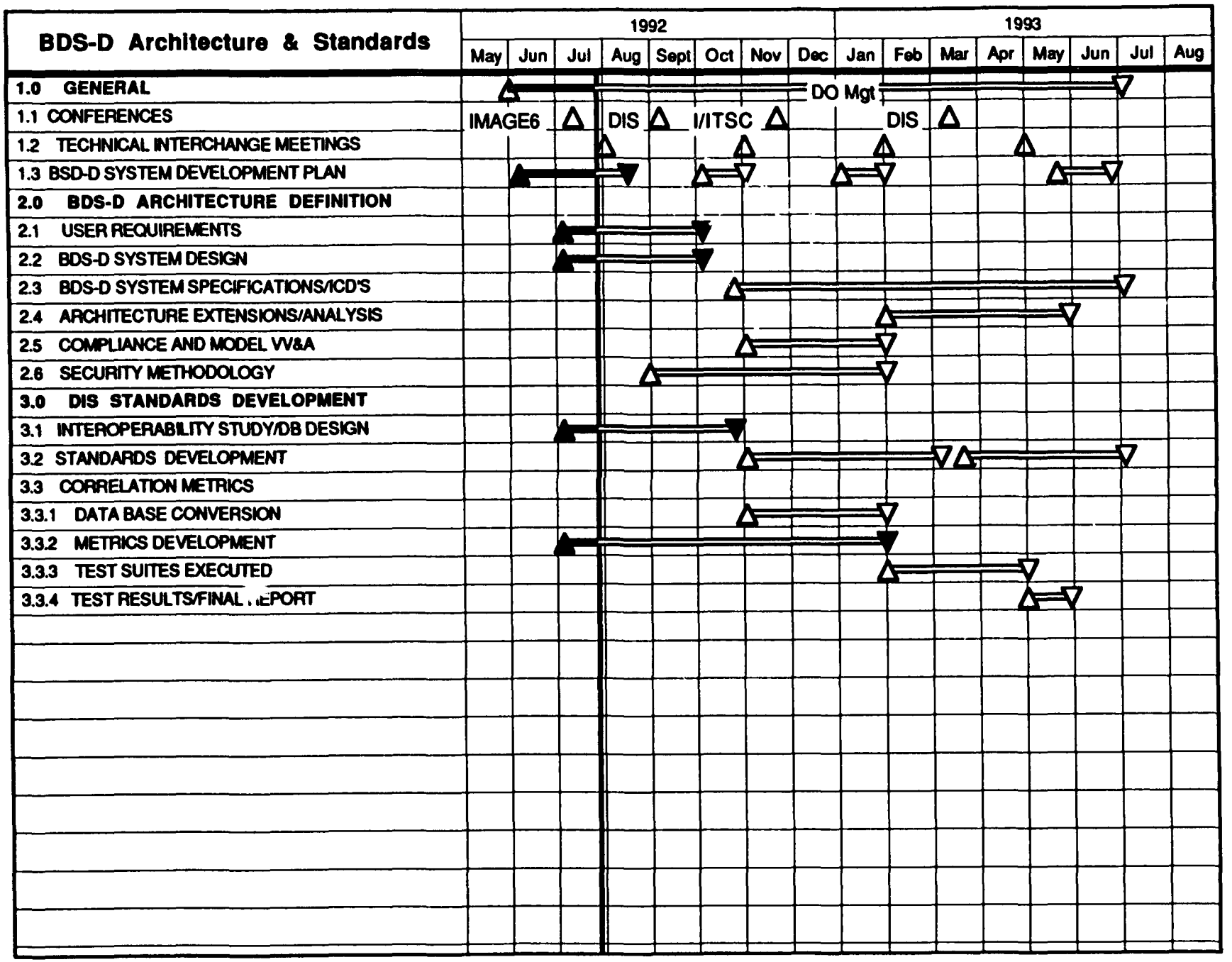
LORAL

BDS-D Architecture Definition & DIS Standards Development



Objectives

- BDS-D Overall Objectives:
  - Primary objective is the instantiation of the BDS-D Version 1.0 System consistent with DIS Architecture and Standards
  - Develop and maintain a BDS-D System Development Plan, including Roadmap, Exit Criteria, Version 1.0 System Description, Op Concept
  - Work with the DIS community to facilitate standards evolution; leverage on-going standards work from P2851, MODSIM, JMASS, etc.
- BDS-D Architecture Objectives:
  - Develop specifications and ICD's for the BDS-D Version 1.0 System
  - Develop extensions of DIS to HOMs and Instrumented Ranges
  - Perform system analysis to quantify network loading, CIU/CAU performance, interoperability issues
  - Develop Compliance, Model VV&A and security methods for BDS-D
- BDS-D Standards Objectives:
  - Develop Strawman Common Data Base Standard (Models & Data)
  - Develop complementary extensions to DIS Message (PDU) Standard
  - Develop Correlation Methodology and Metrics


BDS-D Architecture & Standards
1992
1993
May
Jun
Jul
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
1.0 GENERAL
1.1 CONFERENCES
1.2 TECHNICAL INTERCHANGE MEETINGS
1.3 BSD-D SYSTEM DEVELOPMENT PLAN
2.0 BDS-D ARCHITECTURE DEFINITION
2.1 USER REQUIREMENTS
2.2 BDS-D SYSTEM DESIGN
2.3 BDS-D SYSTEM SPECIFICATIONS/ICD'S
2.4 ARCHITECTURE EXTENSIONS/ANALYSIS
2.5 COMPLIANCE AND MODEL VV&A
2.6 SECURITY METHODOLOGY
3.0 DIS STANDARDS DEVELOPMENT
3.1 INTEROPERABILITY STUDY/DB DESIGN
3.2 STANDARDS DEVELOPMENT
3.3 CORRELATION METRICS
3.3.1 DATA BASE CONVERSION
3.3.2 METRICS DEVELOPMENT
3.3.3 TEST SUITES EXECUTED
3.3.4 TEST RESULTS/FINAL REPORT
DO Mgt
IMAGE6
DIS
I/ITSC
DIS

CGF Architecture & Integration of Higher Order Models

Sponsor/POC	STRICOM	**Phone**	
STRICOM POC	Gene Wiehagen	**Phone**	(407) 380-4363
Loral POC	Bob Ferguson	**Phone**	(407) 382-4597
Funding Source	STRICOM		
Schedule:	**Start** 1 July 1992	**Stop**	30 June 1993

Project Description:

Loral will develop and demonstrate a modular and open architecture for Computer Generated Forces that is capable of independent component development and demonstration in a DIS environment. Key CGF objectives shall include but not be limited to the development of CGF standards for DIS, the leveraging of existing CGF technologies to provide new functionality at low cost, more realistic behaviors via use of a data driven, action-cognition human behavior model, increased CGF battlefield functionality, such as EW, air defense, and indirect fire, CGF responses to environmental effects, such as weather, and single operator control of multiple CGF echelons. The CGF will be demonstrated at Fort Rucker no later than 11 months ARO.

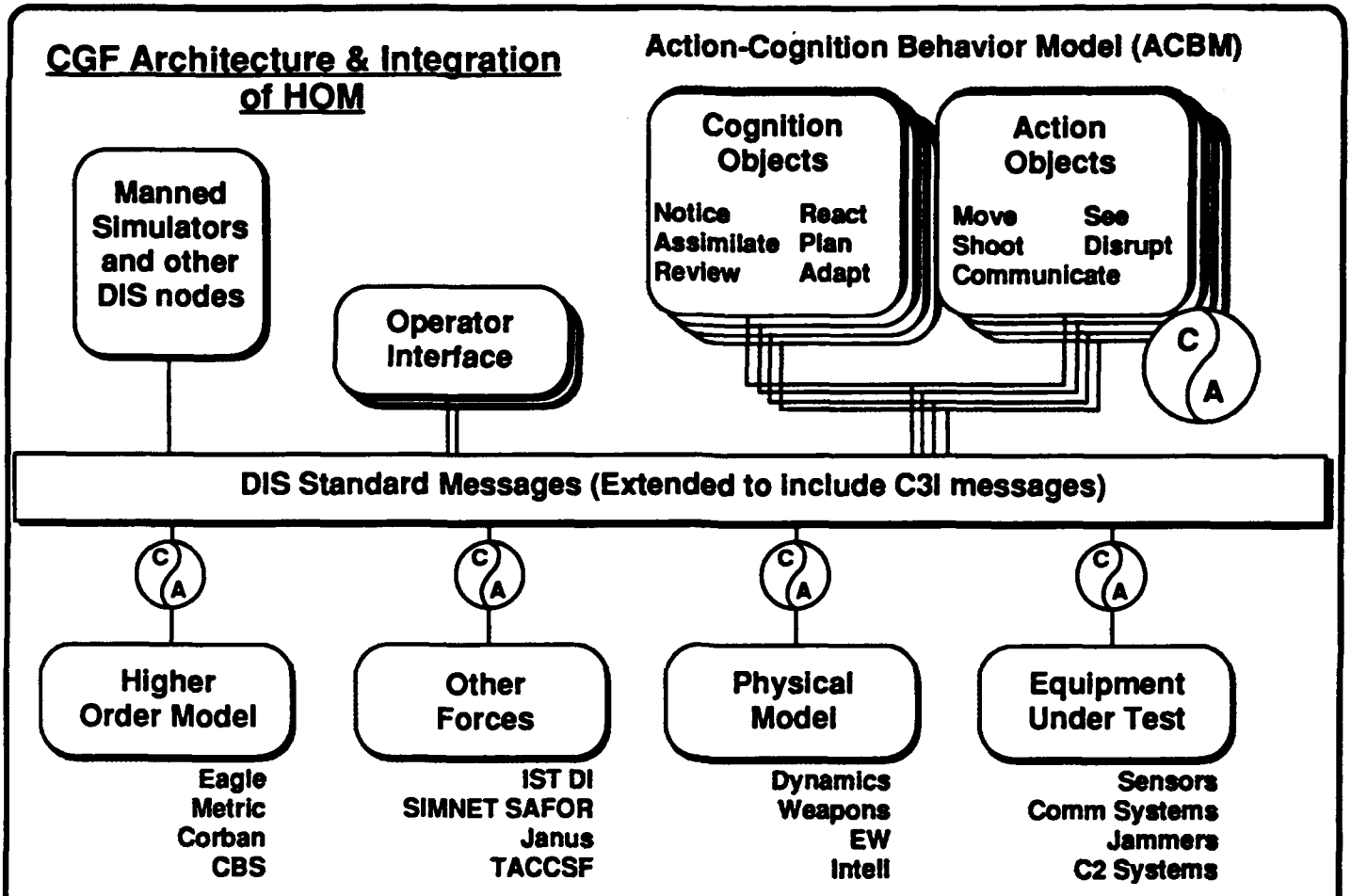
In addition, Loral shall define and catalog the objectives, benefits, and technology challenges associated with the Integration of Higher Order Models (IHOM). The CGF task will provide a "top-down" architecture into which the HOM can be inserted. The ability to provide integrated operation of selected CGF elements in a DIS environment shall be demonstrated at Fort Rucker no later than 11 months ARO.

This Phase 1 work will be performed over a one calendar year period. It is expected that a follow-on phase will be performed for another period of approximately one calendar year. This follow-on phase will be completed on or before September 30, 1994. The primary objective of the follow-on phase shall be the fielding of a documented, validated, and open CGF architecture with all of the capabilities of the current SAFOR plus additional simulated battlefield capabilities. In the follow-on phase this CGF system shall be focused towards the needs of the RAH-66 program and other related BDS-D Version 1.0 System requirements in accordance with the BDS-D System Plan.

Project Status:

Contract award was made on June 30, 1992. A kick-off meeting was held with all team members on July 7-9 at the ADST office.

CGF Architecture & Integration of HOM



External Models & Systems

- UNIX based, C and C++, runs on multiple platforms
- True object oriented design
- Objects communicate via messages
  - Messages are standardized
  - DIS Extension for C3I messages
- Source code and documentation will be available
- Standard methods to interface to existing systems

Exit Criteria

- **Modular/Reuseable Design**
- **DIS Compliance**
- **Model VV&A**
- **Day/night, Obscurants, Weather**
- **Selectively Changeable Features**
- **Fidelity Adequate for Nav/Maneuver**
- **80 Entities Controlled by 1 CGF User**
- **Air Defense, Indirect Fire, EW**
- **Higher Order Model**

LORAL

CSRDF - BDS-D Interface

Sponsor/POC AVSCOM / Nancy Bucher **Phone** (415) 604-5161

STRICOM POC Gene Wiehagen **Phone** (407) 380-4363

Loral POC Jim Exter **Phone** (407) 382-4595

Funding Source

Schedule: **Start** 1 April 1992 (Step 2) **Stop** 31 March 1992 (Phase 1)

Project Description:

The CSRDF - BDS-D Interface Delivery Order is a cooperative effort among the U. S. Army, DARPA, and the U. S. Navy. Each is aggressively pursuing interoperable simulation as a highly leverageable technology to significantly enhance combat readiness as well as system acquisition. Each has a defined role in this linkage and success is dependent on the cooperation among the three government groups and their respective contractors.

The CSRDF/BDS-D project has two Phases: Phase 1 is the specification development and linkage implementation phase. After development is completed and the linkage is established, the Phase 2 Rotorcraft Pilot Associate (RPA) evaluations will begin. The Rotorcraft Pilots Associate (RPA) Program will examine ways in which pilot workload can be reduced while improving combat helicopter mission effectiveness through the application of artificial intelligence (AI) for cognitive decision aiding and integration of advanced pilotage, target acquisition, armament and fire control, communication, controls and displays, navigation, survivability, and flight control equipment.

The following are responsibilities of STRICOM and are to be executed by Loral or its subcontractors.

1. A correlated data base with terrain data and graphic models will be developed to facilitate the combined operation of systems at Ft. Rucker and at Nasa Ames in the same battlefield environment.
2. A Data Logger will be provided for recording, searching and playing back packets that flow across the interface.
3. A long haul network interface will be established to communicate between simulator systems located in Alabama and California.
4. A protocol translation capability will be developed to allow the CSRDF system running DIS 1.0 Protocol to interoperate with the Ft. Rucker simulators running the older SimNet 6.6.1 Protocol.

Project Status:

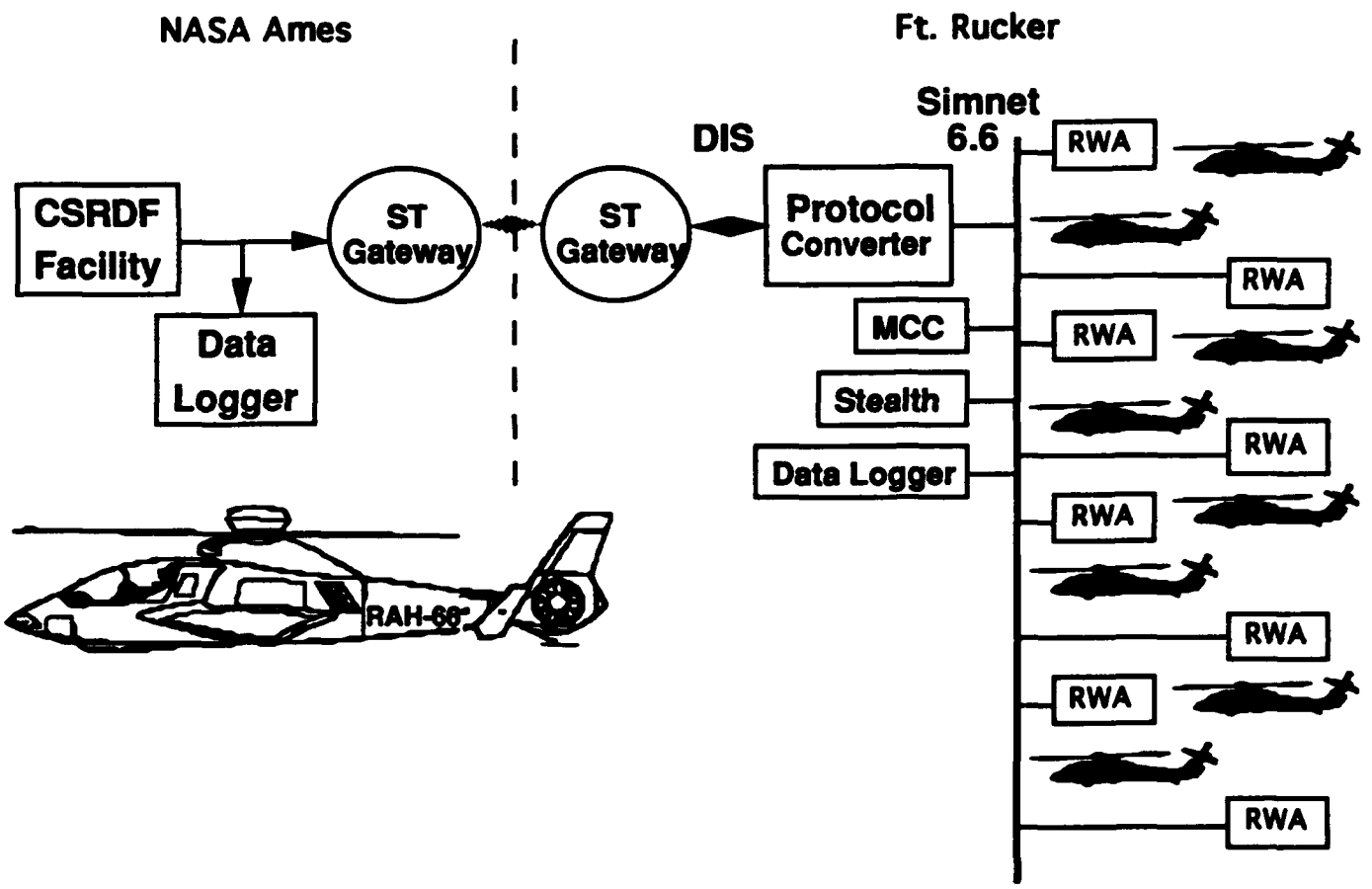
The CSRDF - BDS-D Interface Delivery Order is progressing on schedule with the following exceptions.

The Fulda Data Base specified for the RPA evaluations was identified as GFE during the requirements phase of the program. After starting development, it was discovered the Fulda Data Base was not Government Property and therefore was not readily available without restrictions/software licensing agreements etc. The data base transformation task started about two and one half months late. However, much of the delay was used to identify faster methods of transformation thereby reducing the overall transformation time.

One other problem affecting a number of Delivery Orders is the late delivery of critical GFE from BBN as part of the equipment transfer under the ADST contract. Delays in receiving Data Base workstation and Data Logger equipment has caused a development schedule slip.

LORAL

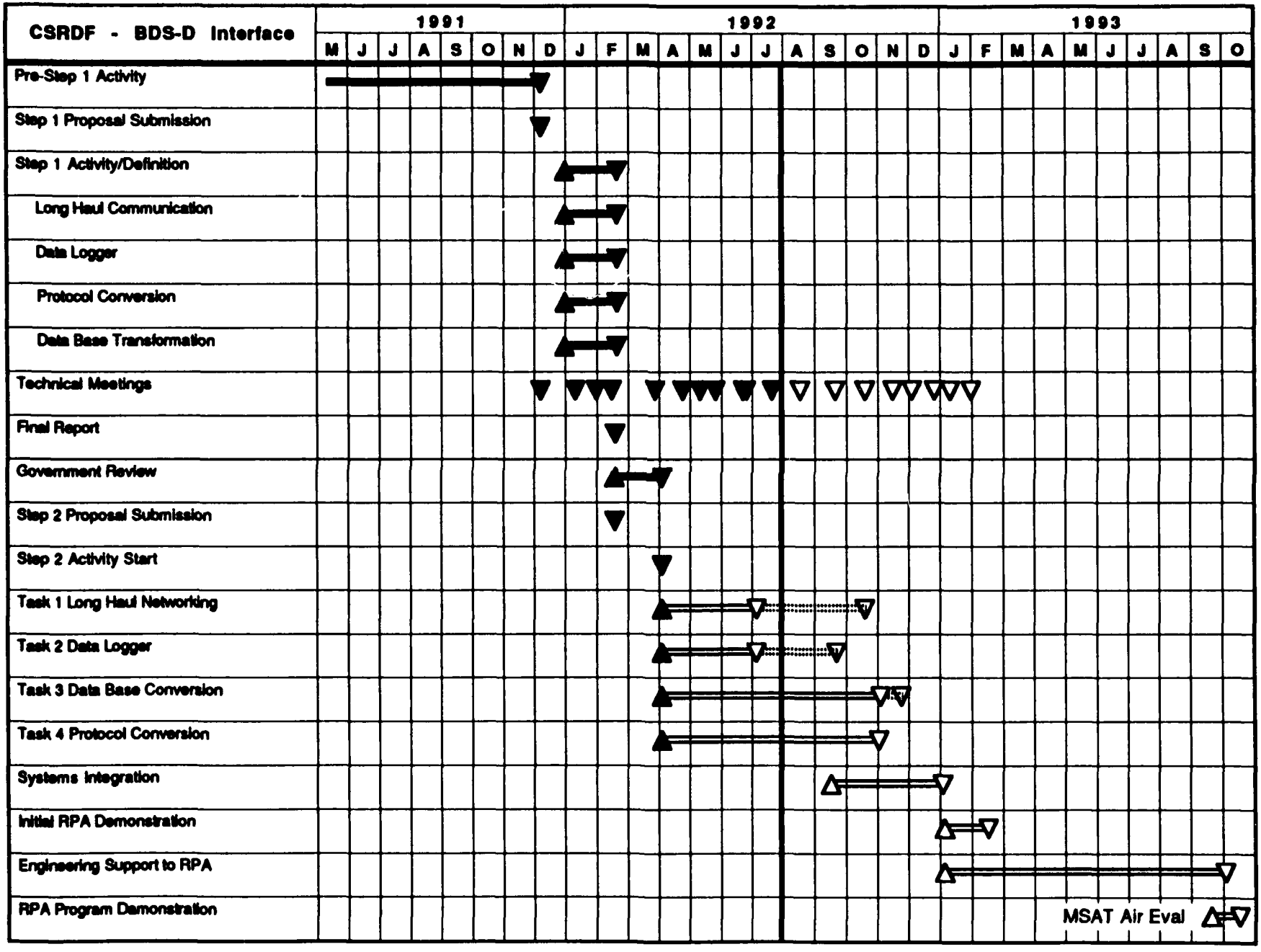
CSRDF - BDS-D Interface



Exit Criteria or Objective

- Dissimilar Simulator Fidelity
- Mixed LANs
- Wide Area Network
- DIS Compliance
- Level 2 CIG (Compuscene IV)
- Thermal Signature
- Day/Night Obscurants, Weather
- Selectively Changeable Features
- Fidelity Adequate for Nav/Maneuver

LORAL


CSRDF - BDS-D Interface
1991
1992
1993
M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O
Pre-Step 1 Activity
Step 1 Proposal Submission
Step 1 Activity/Definition
Long Haul Communication
Data Logger
Protocol Conversion
Data Base Transformation
Technical Meetings
Final Report
Government Review
Step 2 Proposal Submission
Step 2 Activity Start
Task 1 Long Haul Networking
Task 2 Data Logger
Task 3 Data Base Conversion
Task 4 Protocol Conversion
Systems Integration
Initial RPA Demonstration
Engineering Support to RPA
RPA Program Demonstration
MSAT Air Eval

Combat Vehicle Command & Control

Sponsor/POC	ARI / Dr. Kathy Quinkert	**Phone**	502-624-6928
STRICOM POC	John Collins	**Phone**	407-380-4382
Loral POC	W. R. 'Mac' MacDiarmid	**Phone**	407-382-4583

Funding Source TACOM

Schedule: **Start** 26 August 1991 **Stop** 30 September 1992

Project Description:

The CVCC Delivery Order is a follow-on to earlier ARI-sponsored efforts that looked at the performance deltas of units equipped with combat vehicles utilizing enhanced command and control devices. Those units involved in earlier experiments were below battalion level. The current effort, which focuses on the battalion, involves the use of the Intervehicular Information System (IVIS), the Command and Control Display (CCD), and the Commander's Independent Thermal Viewer (CITV) as well as a steer-to display for the vehicle driver.

Hardware was procured and software developed to support the evaluations. Software bugs from previous software versions were fixed. In addition to functional and integration testing of the hardware/software suites, a total of five experimental runs are being conducted: three in the baseline condition (utilizing non-CVCC-equipped M1 simulators) and two in the CVCC condition. Based on experimental and scenario design approved by the Government, data will be collected to analyze the resulting performance deltas. A series of data collection exercise excursions will be run to analyze vertical communications within the battalion. An additional task involves the development of innovative training strategies for future development.

Major subcontractors on this effort are BDM (experimental design and evaluation) and BBN (software development and integration).

Project Status:

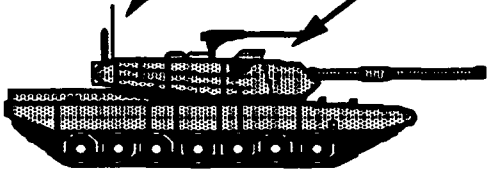
Two of the three baseline experiments have been conducted. Integration testing occurred toward the end of June 1992. Functional testing will be conducted the week of 20 July unless the Hollis studies force schedule delays. The third baseline and the two CVCC experiments will be conducted in July and August, again subject to decisions regarding the Hollis studies. Any necessary replays, final data analysis, and technical report preparation will be accomplished following the final experiment. A no-cost extension is being proposed to allow sufficient time for thorough data analysis and reduction and preparation of the final report (to include peer review).

Combat Vehicle Command and Control

CVCC

COMMUNICATION
- DIGITAL REPORTS
- DIGITAL GRAPHICS
- LRF INPUT TO REPORTS
- DIGITAL BURST TRANSMISSION

CITV
- INDEPENDENT THERMAL VIEWER
- HUNTER/KILLER CAPABILITY
- TARGET DESIGNATION
- INDEPENDENT LASER

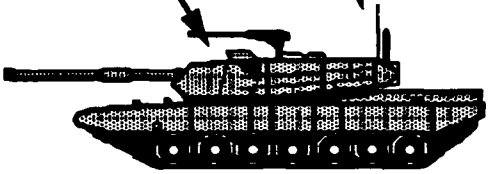


POSNAV
- DIGITAL MAP
- OWN VEHICLE ICON
- FRIENDLY VEHICLE LOCATIONS
- ROUTE WAYPOINTS
- DRIVER'S STEER-TO-DISPLAY

M1 BASELINE

TARGET ENGAGEMENT
- GPS/GPSE/TIS
- TURRET REFERENCE DISPLAY

COMMUNICATION
- SINCGARS (VOICE ONLY)

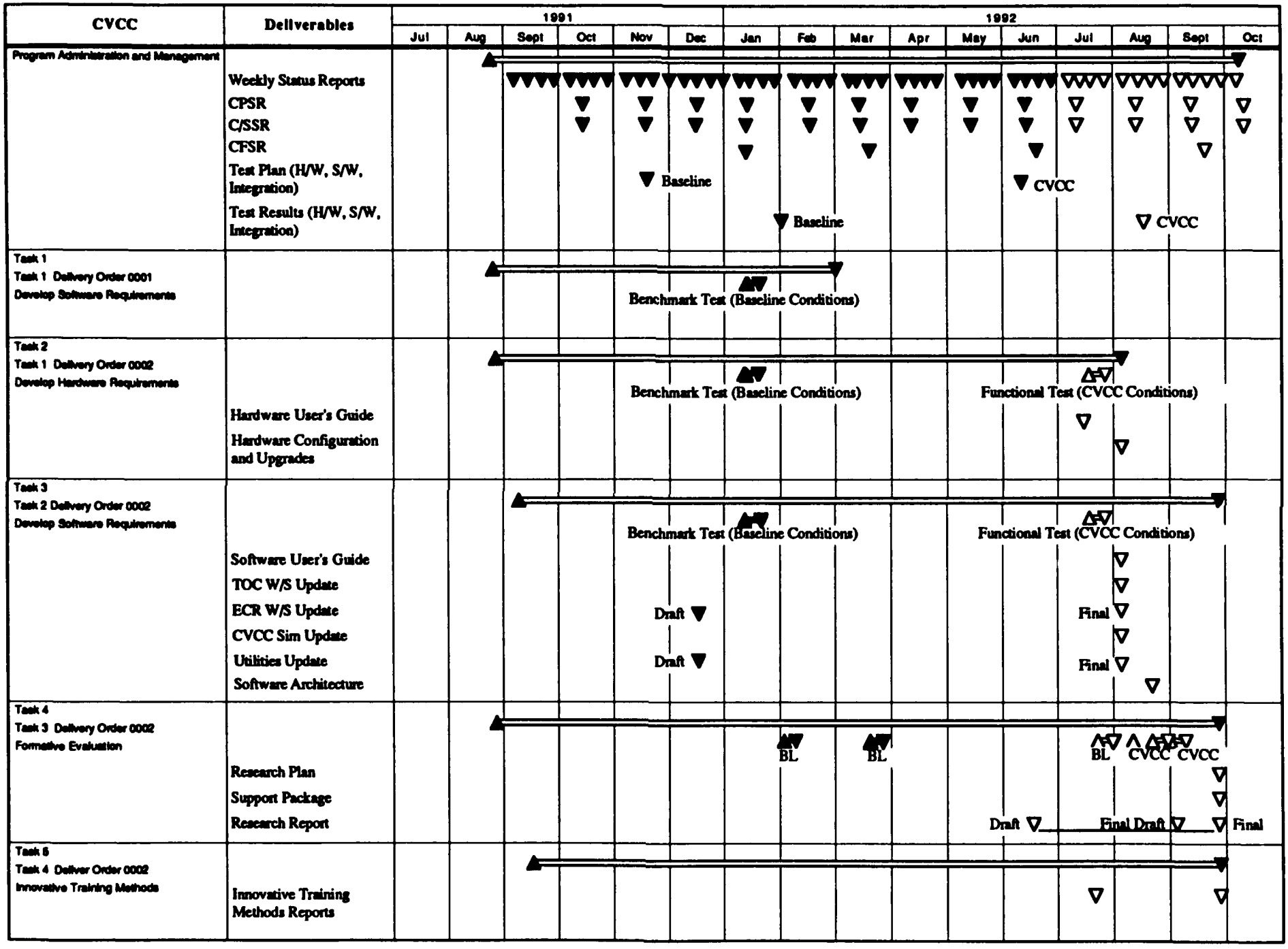


NAVIGATION
- VISION BLOCKS
- PAPER MAP W/ OVERLAYS
- GUNNER'S LRF

Exit Criteria or Objective

- Assess Automated Command and Control
- Horizontal Flow of Information (Formative Evaluations)
- Vertical Flow of Information (Data Collection Exercises)
- Evaluate Unit Effectiveness as a Result of Automated Command and Control
- SAFOR Message Generation

LORAL


CVCC
Deliverables
1991
1992
Jul
Aug
Sept
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sept
Oct
Program Administration and Management
Weekly Status Reports
CPSR
C/SSR
CFSR
Test Plan (H/W, S/W, Integration)
Test Results (H/W, S/W, Integration)
Baseline
CVCC
Baseline
CVCC
Task 1
Task 1 Delivery Order 0001
Develop Software Requirements
Benchmark Test (Baseline Conditions)
Task 2
Task 1 Delivery Order 0002
Develop Hardware Requirements
Benchmark Test (Baseline Conditions)
Functional Test (CVCC Conditions)
Hardware User's Guide
Hardware Configuration and Upgrades
Task 3
Task 2 Delivery Order 0002
Develop Software Requirements
Benchmark Test (Baseline Conditions)
Functional Test (CVCC Conditions)
Software User's Guide
TOC W/S Update
ECR W/S Update
CVCC Sim Update
Utilities Update
Software Architecture
Draft
Draft
Final
Final
Task 4
Task 3 Delivery Order 0002
Formative Evaluation
BL
BL
BL
CVCC
CVCC
Research Plan
Support Package
Research Report
Draft
Final Draft
Final
Task 5
Task 4 Deliver Order 0002
Innovative Training Methods
Innovative Training Methods Reports

DOTD Training DO

Sponsor/POC DOS/LTC Aaron **Phone** (205) 255-3320

STRICOM POC _____ **Phone** _____

LORAL POC John Tallas **Phone** (205) 598-3066

Funding Source USAAVNC

Schedule: **Start** 1 January 1993 **Stop** 31 December 1993

Project Description:

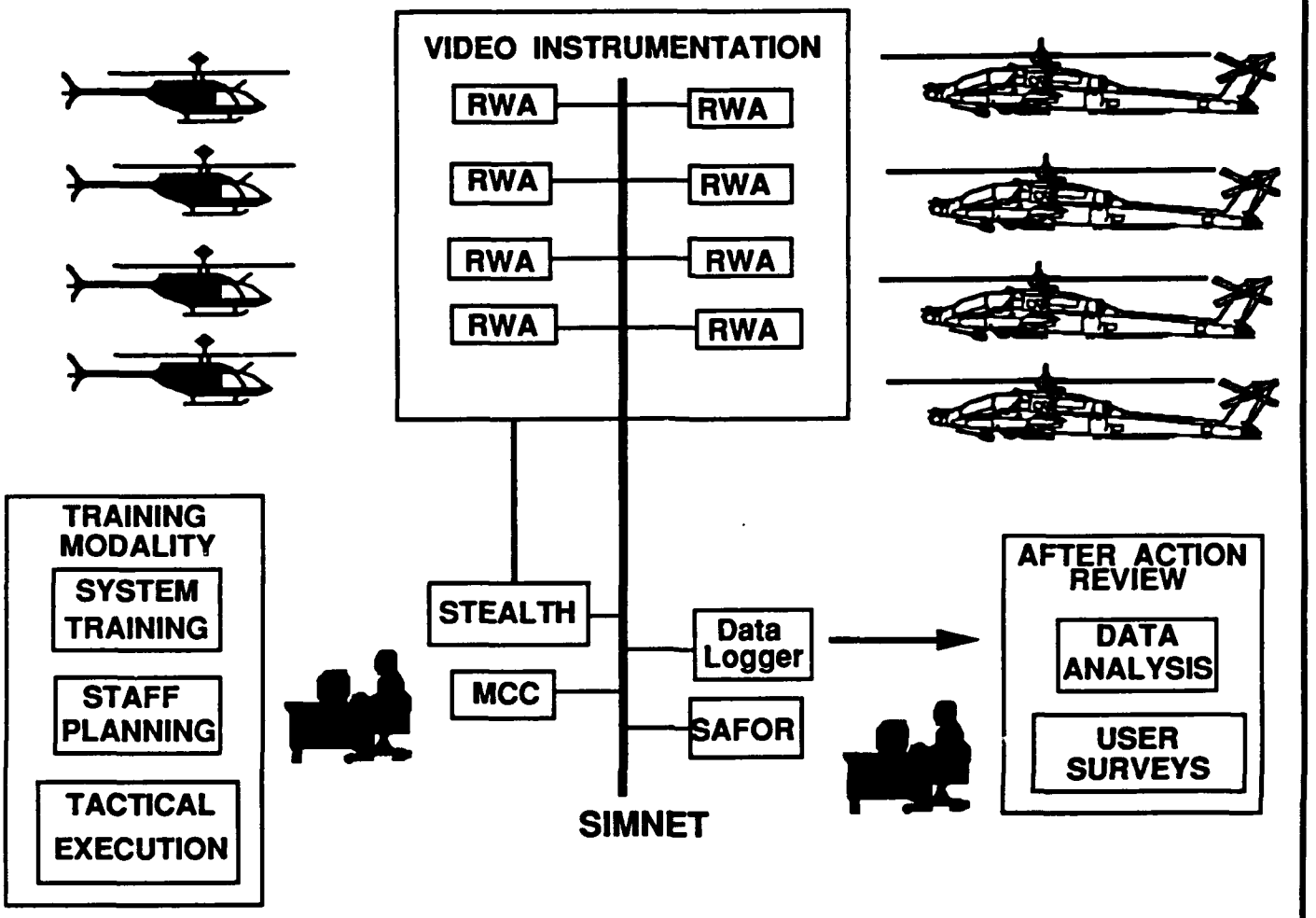
The objective of the DOTD Training Development Delivery Order is to determine the aviation pilot/crew/unit collective tasks that BDS-D can facilitate in a service school operational setting and to determine the feasibility of coordinating operational training exercises in a combined arms environment.

Project Status:

The experiment continues to reap success in application and satisfaction among users. Trainer and student questionnaires have been revised to enhance internal validity. The resultant data, although admittedly subjective in nature, still indicate vast user acceptance and training potential which has not been fully exploited. Credence to this observation is provided by the US Army Aviation Center's recent statement of work submission which requests continuance of this delivery order for the duration of the LSE contract period. A final delivery order report will be submitted at the end of the current delivery order period (December 92).

LORAL

TRAINING DO CONFIGURATION



Exit Criteria or Objective

The overall test design was intended to evaluate the effectiveness of AIRNET as a task trainer to the identified deficiencies from the Battlefield Development Plan in a combined arms environment. The study was initially scheduled to be conducted over an 18-month period in four phases:

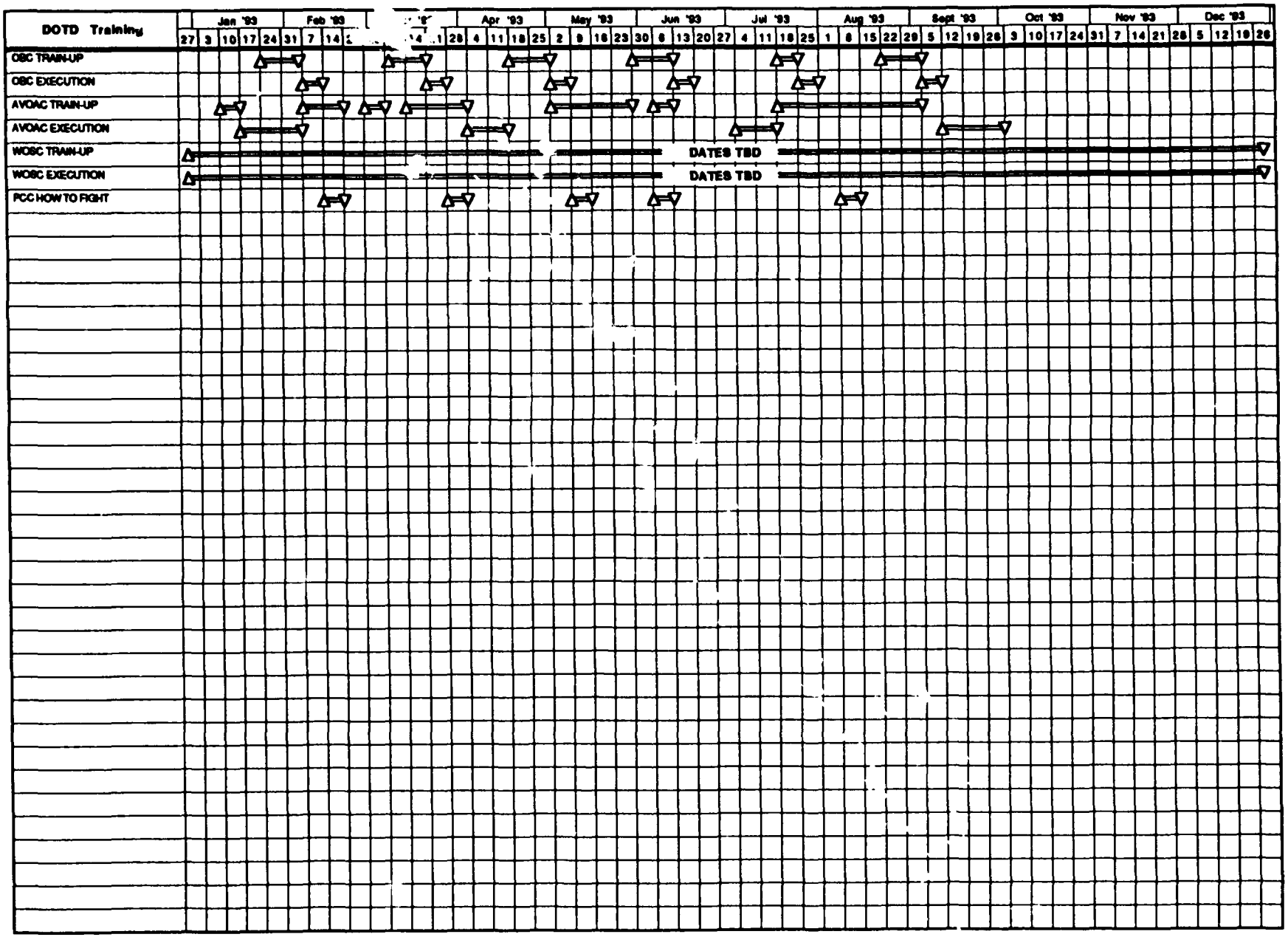
Phase 1 - Determine the appropriate application of AIRNET in the program of instruction (POI) for Aviation officer professional training, to determine cost comparison factors, to identify and isolate measures of effectiveness, and to establish baseline reference and comparative factors.

Phase 2 - Construct, tailor, and refine the POI application through experiments with each population in each POI of sufficient numbers to ensure application validity.

Phase 3 - Execute the applications as trial runs using the identified measures of effectiveness and cost comparison factors.

Phase 4 - Analyze and evaluate the results and publish a final technical report.

LORAL


DOTD Training
Jan '93
Feb '93
Apr '93
May '93
Jun '93
Jul '93
Aug '93
Sept '93
Oct '93
Nov '93
Dec '93
27 3 10 17 24 31 7 14 28 4 11 18 25 2 9 16 23 30 6 13 20 27 4 11 18 25 1 8 15 22 29 5 12 19 26 3 10 17 24 31 7 14 21 28 5 12 19 26
OBC TRAIN-UP
OBC EXECUTION
AVOAC TRAIN-UP
AVOAC EXECUTION
WOBC TRAIN-UP
WOBC EXECUTION
PCC HOW TO FIGHT
DATES TBD
DATES TBD

Dynamic Terrain

Sponsor/POC	STRICOM/Gene Wiehagen	**Phone**	407-380-4363
IST POC	Mike Moshell	**Phone**	407-658-5093
Loral POC	Bob Ferguson	**Phone**	407-382-4597
Funding Source	STRICOM via IST		
Schedule: Start	1 August 1992	**Stop**	1 September 1993

Project Description:

Background. When a weapon detonates on the ground it changes the terrain - craters are formed and buildings are destroyed. For defensive purposes berms may be erected, or trenches dug. The occurrence of these transient changes in the environment during an exercise is referred to as dynamic terrain. The difficulty representing these environmental changes on the virtual battlefield is acknowledged by STRICOM's BDS-D Advanced Technology Demonstration Technology Development Plan (ATD/TDP):

"Achievement of dynamic terrain capability in BDS-D .... simulated environments will require overcoming the technical barrier of implementing real time or near real time data base formatters as part of the simulator Image Generator design."

Loral (as a subcontractor to IST) will support the development, implementation and test of dynamic terrain in the BDS-D environment.

Actions. To conduct the necessary experiments and demonstrations, IST requests Loral to carry out the following actions:

1) Solicit from appropriate CIG vendors, bids to participate in the following project:

a) the design of Dynamic Environment Protocol Description Units
b) the modification of CIG equipment to accept these PDUs
c) the testing of the modified CIGs within a multi-vendor testbed

2) Work with the CIG vendors and with IST during all phases of the project by participating in the design and testing phases (a, c) and by providing laboratory support and housing for the CIGs, and communications networking to IST.

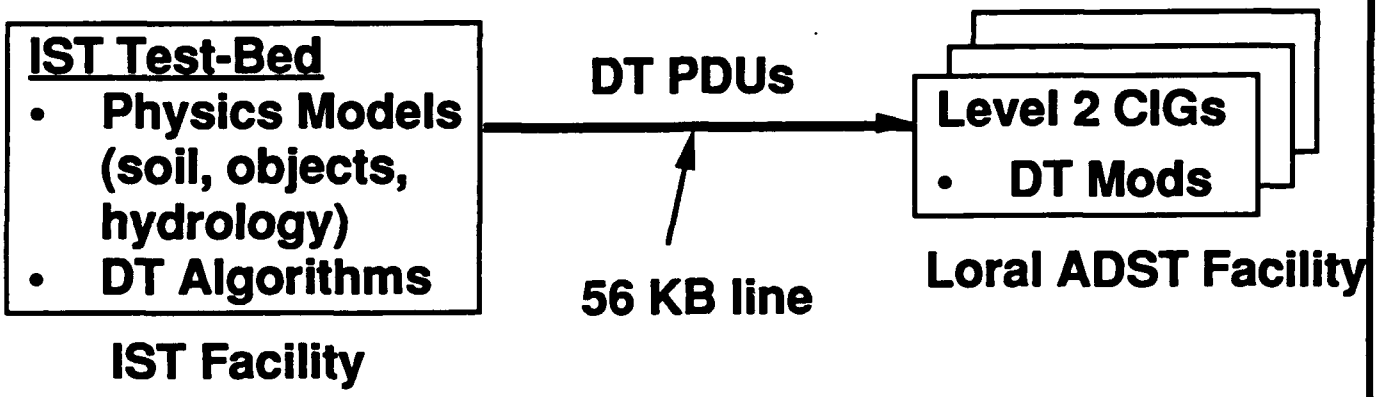
3) Work with other components of the BDS-D Testbed to maintain liaison concerning dynamic environment activities not included in the Dynamic Terrain Project (e. g. weather) so as to maximize the relevance of the results of this project to future users.

Project Status:

Loral is currently in the process of writing a proposal to IST for Dynamic terrain; the proposal is due July 27, 1992. Contract award is expected August 3, 1992.

LORAL

Dynamic Terrain



Objectives

Exit Criteria Objectives.

a) Real-time changes to terrain features
b) Selectively changeable features
c) DIS 1.0 compliance
d) Project 2851 compatible

General Objectives. The overall objective of the Dynamic Terrain project is to prove the feasibility of real-time or near-real-time Dynamic Terrain in the BDS-D environment. In order to accomplish this objective, the following objectives must also be achieved:

a) the development of Dynamic Terrain Protocol Data Units consistent with DIS standards and protocols;

b) the modification of one or more Image Generators to implement Dynamic Terrain;

c) the testing and demonstration of the Dynamic Terrain modifications to the BDS-D image generators in the Loral facility, with PDUs supplied by IST over the dedicated 56kb link.

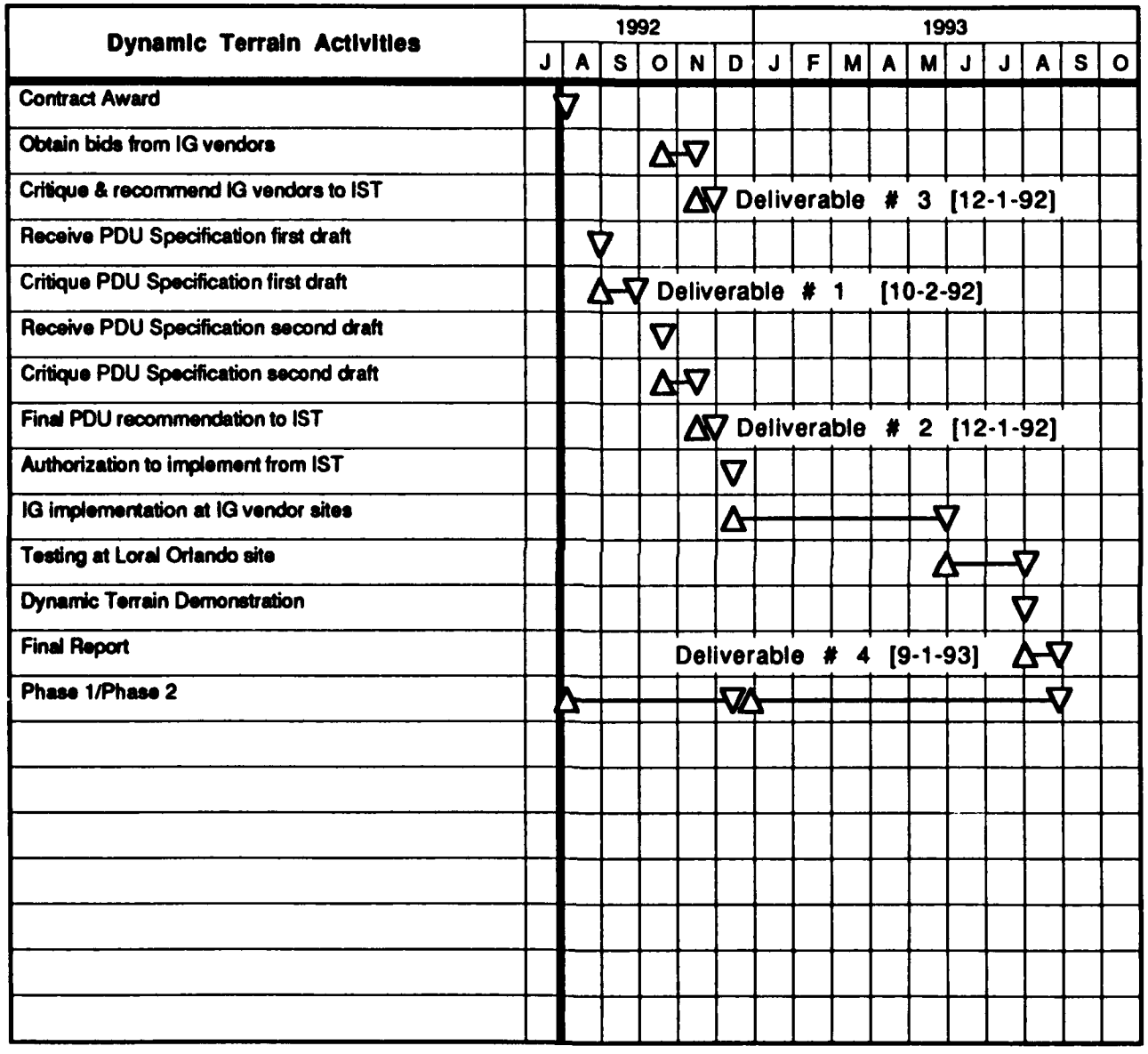
Specific Objectives. In order to demonstrate dynamic terrain in the form of modifications to the terrain skin and areal features such as waterways, during a real-time graphical simulation, it is desirable that image generators be able to:

a) accept packets of information describing these changes, during a running simulation;

b) incorporate the requested changes into the visual database with real changes to the corresponding elevation profiles (not, for instance, just superimposed texture patches to simulate a depressed area); and without causing a pause in the running simulation;

c) subsequently, to both render visual images based on the new geometry, and to respond correctly to elevation and slope queries from moving models (if the CIG normally supports this capability), based on the modified terrain.

LORAL


Dynamic Terrain Activities
1992
1993
J A S O N D J F M A M J J A S O
Contract Award
Obtain bids from IG vendors
Critique & recommend IG vendors to IST
Deliverable # 3 [12-1-92]
Receive PDU Specification first draft
Critique PDU Specification first draft
Deliverable # 1 [10-2-92]
Receive PDU Specification second draft
Critique PDU Specification second draft
Final PDU recommendation to IST
Deliverable # 2 [12-1-92]
Authorization to implement from IST
IG implementation at IG vendor sites
Testing at Loral Orlando site
Dynamic Terrain Demonstration
Final Report
Deliverable # 4 [9-1-93]
Phase 1/Phase 2

Electronic Information Exchange Network

Sponsor/POC	STRICOM	**Phone**	
STRICOM POC	Gene Wiehagen	**Phone**	(407) 380-4363
LORAL POC	Bill Lewandowski	**Phone**	(408) 473-4362
Funding Source	STRICOM		
Schedule:	**Start**	**Stop**	

Project Description:

Provide hardware to support software engineering and electronic information exchange for LSE.

The Institute for Simulation & Training and STRICOM have been connected to the ADST PMO and Loral Western Development Labs in San Jose.

Project Status:

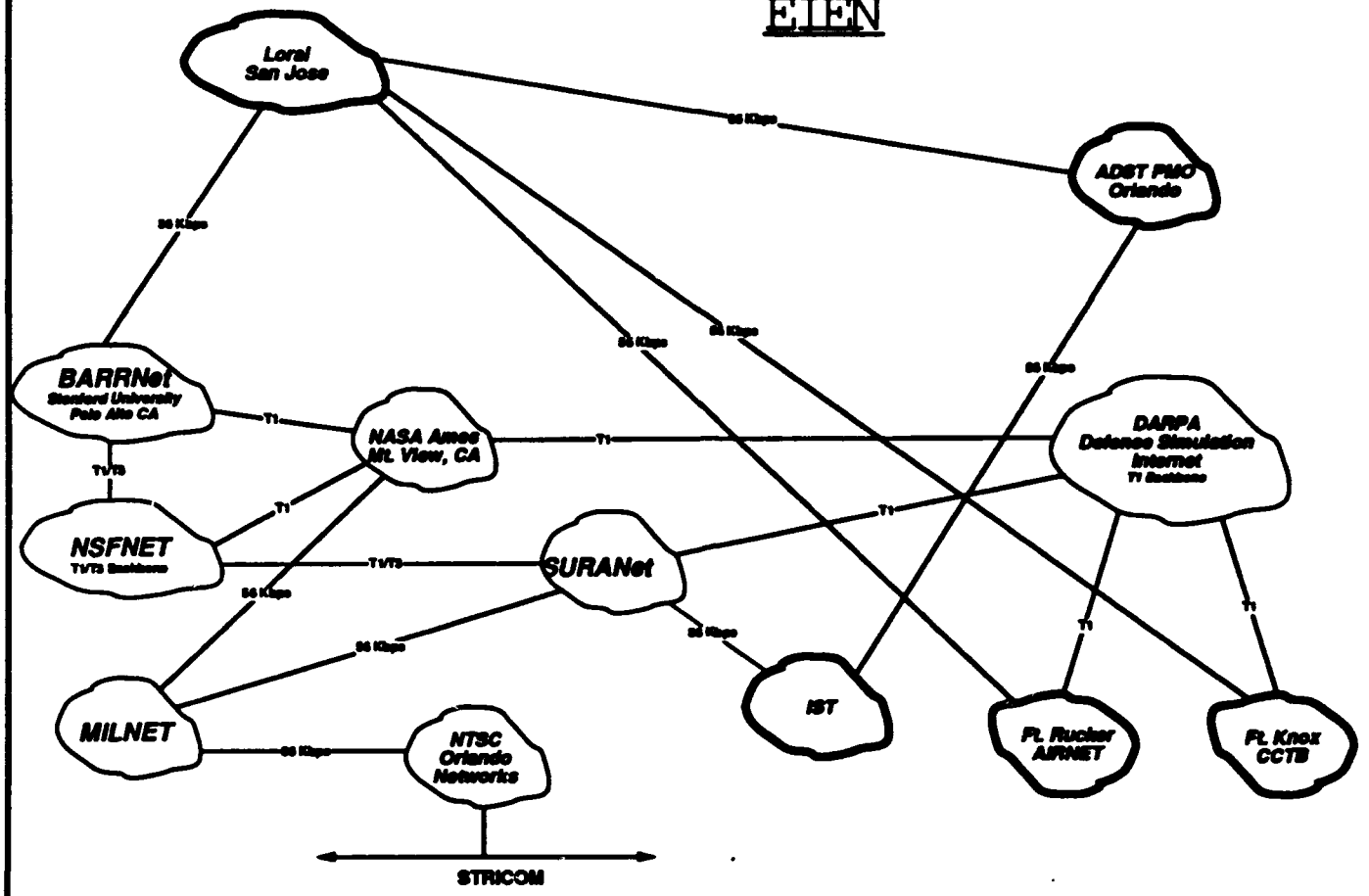
Macintosh updates for Ft. Rucker and Ft. Knox were approved by STRICOM this quarter. Equipment is about to be ordered. As part of the new current year EIEN, spare Sun Microsystems computer equipment will be bought instead of maintenance on all but critical items.

The Ft. Rucker to San Jose EIEN Data Circuit may be moved from AT&T toSprint in the coming quarter. Even though Loral and AT&T are about to implement aTariff 12, this circuit appears less costly with Sprint ($12K Yr.). This is because the AT&T access point is in Montgomery AL and Sprint is in Dothan AL.

Maintenance on LSE Computer Hardware/Software and networks continues.

LORAL

EIEN



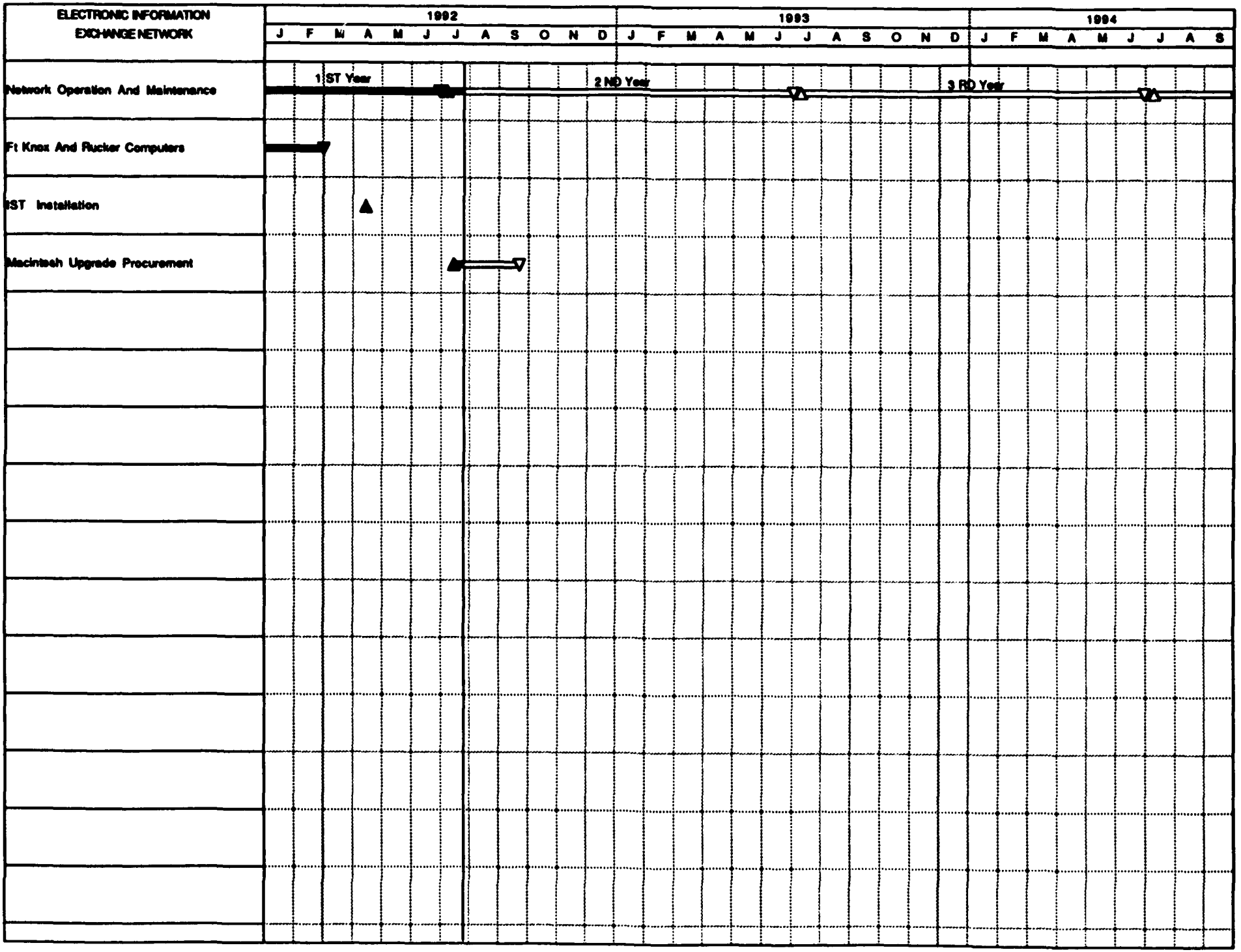
Exit Criteria or Objective

- Exit Criteria -
  System Architecture; Documentation; Controlled Public Access

- Provide communications backbone network to allow rapid information exchange between ADST related sites.

- Provide for computing facilities at ADST sites for information processing and management

- Provide a Bulletin Board System to allow information distribution to the distributed simulation community


ELECTRONIC INFORMATION EXCHANGE NETWORK
1992
1993
1994
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S
Network Operation And Maintenance
1 ST Year
2 ND Year
3 RD Year
Ft Knox And Rucker Computers
IST Installation
Macintosh Upgrade Procurement

HEL Intelligibility Study

Sponsor/POC	HEL / Dr. George Garinther	**Phone**	(301) 278-5984
STRICOM POC	John Collins	**Phone**	(407) 380-4382
LORAL POC	Tom Radgowski	**Phone**	(502) 942-1092
Funding Source	Human Engineering Lab / STRICOM		
Schedule: **Start**	2 March 1992	**Stop**	28 August 1992

Project Description:

This experiment will help HEL develop a model that will predict soldier performance as a function of speech intelligibility. The Force-on-Force portion of this test is designed to examine speech intelligibility issues at platoon level in a freeplay war fighting environment.

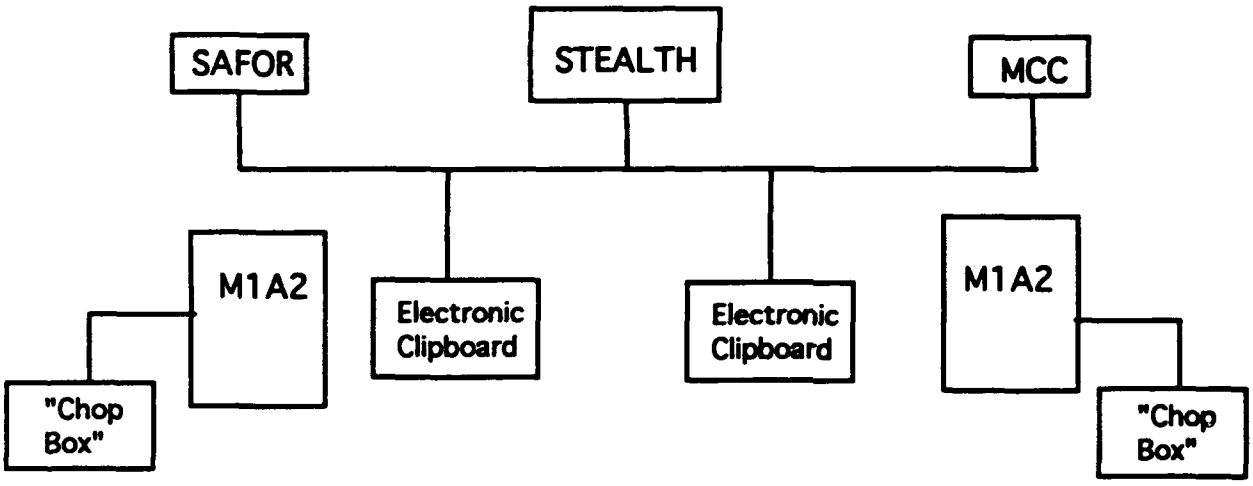
The Force-on-Force portion of this test has been postponed due to the impact of the Hollis experiment. At present, it is not known when we will be able to conduct this test.

Project Status:

HEL has MIPRed funds to STRICOM to cover the cost of this activity. *Refund of these costs* may be required if the test cannot be rescheduled to HEL's satisfaction.

LORAL

HEL Force-on-Force Test Network



Exit Criteria or Objective

Inputs from HEL Intelligibility Force-on-Force test may include advancements in:

- Automated Data Collection Procedures
- Validity of Synthetic Battlefield

LOGAL

HEL Schedule not
available
at this time.

LORAL

Hollis Experiment

Sponsor/POC DUSA-OR / Mr. Hollis **Phone** _____

STRICOM POC John Collins **Phone** (407) 380-4382

LORAL POC Jorge Cadiz **Phone** (407) 382-4598

Funding Source PEO-ASM / OPTEC

Schedule: **Start** 30 June, 1992 **Stop** 18 August, 1992

Project Description:

The Hollis test is utilizing the existing CCTB M1A2 devices to simulate potential variant platforms for the migration of the M1A1 to the M1A2. Test runs will be made with a M1A1, M1A1 w/CITV, M1A1 w/PosNav, and M1A2. Scenarios isolate tank on tank battles with hasty defensive and hasty offensive maneuvers. The existing four manned simulators are being used as platoon leaders with blue SAFOR providing "tethered" forces to round out each platoon. Opposing forces are be provided by the red SAFOR, using the next generation advanced threat, Leo II+, from AMSAA provided data.

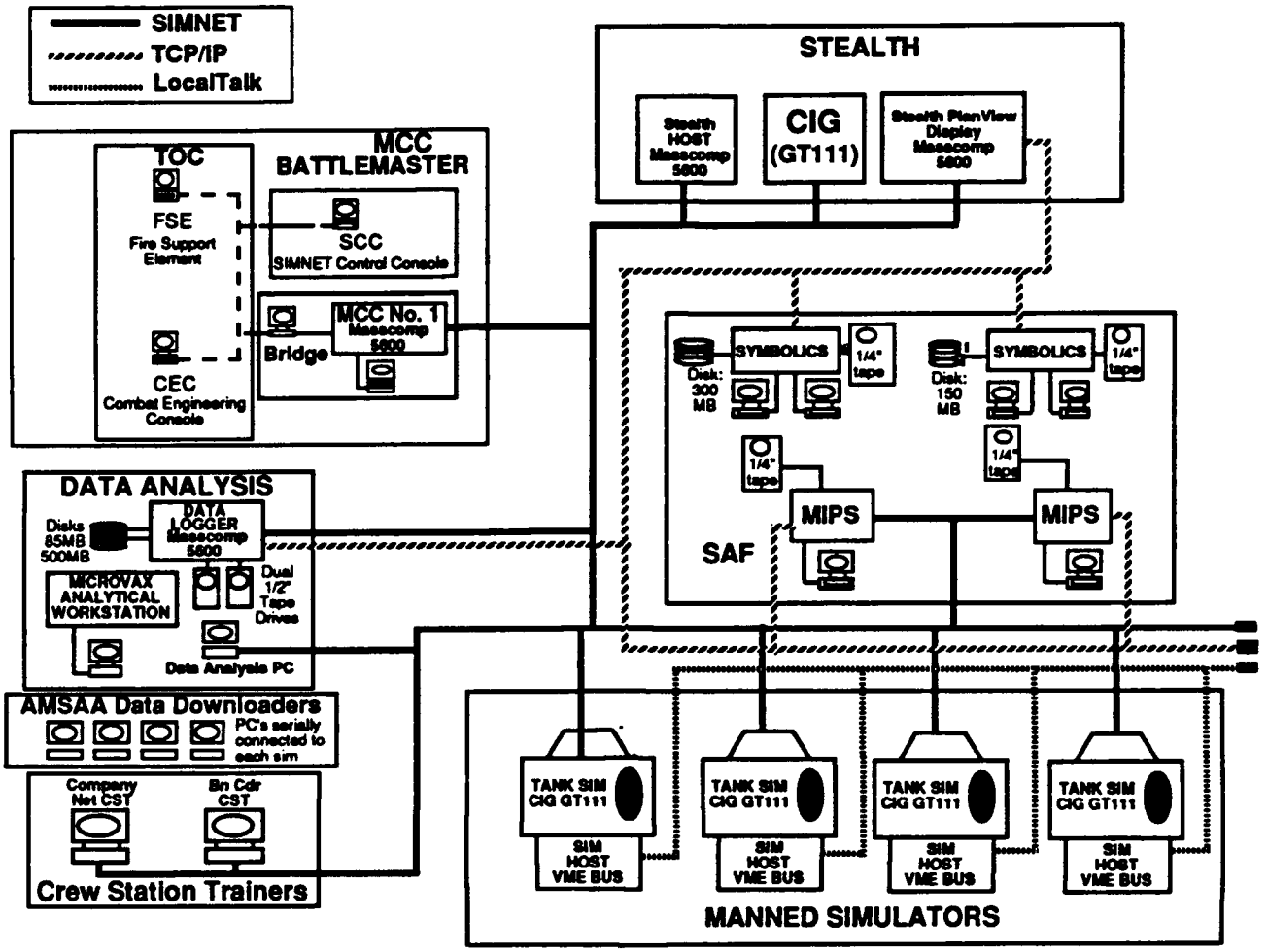
The system test configuration requires isolation of the test specific equipment to provide for secure operation. The equipment for this test included a stealth, an MCC, two SAFs, four manned simulators, a data analysis station, data downloaders, and two Crew Station trainers. The test schedule calls for 28 vignette of approximately 2 .5 hours each.

Project Status:

- SAFOR Modifications to incorporate AMSAA Values for Pk, Pd, and Ph complete
- Modifications to Manned Vehicles to Incorporate AMSAA Pk Values for M1A1 or M1A2 complete
- DIS Classification of CCTB, Ft. Knox Complete
- Testing continuing to determine system limitations
- Classified Data for M1A2 & SAFOR Threat has been Loaded and Verified by AMSAA

LORAL

Hollis Experiment

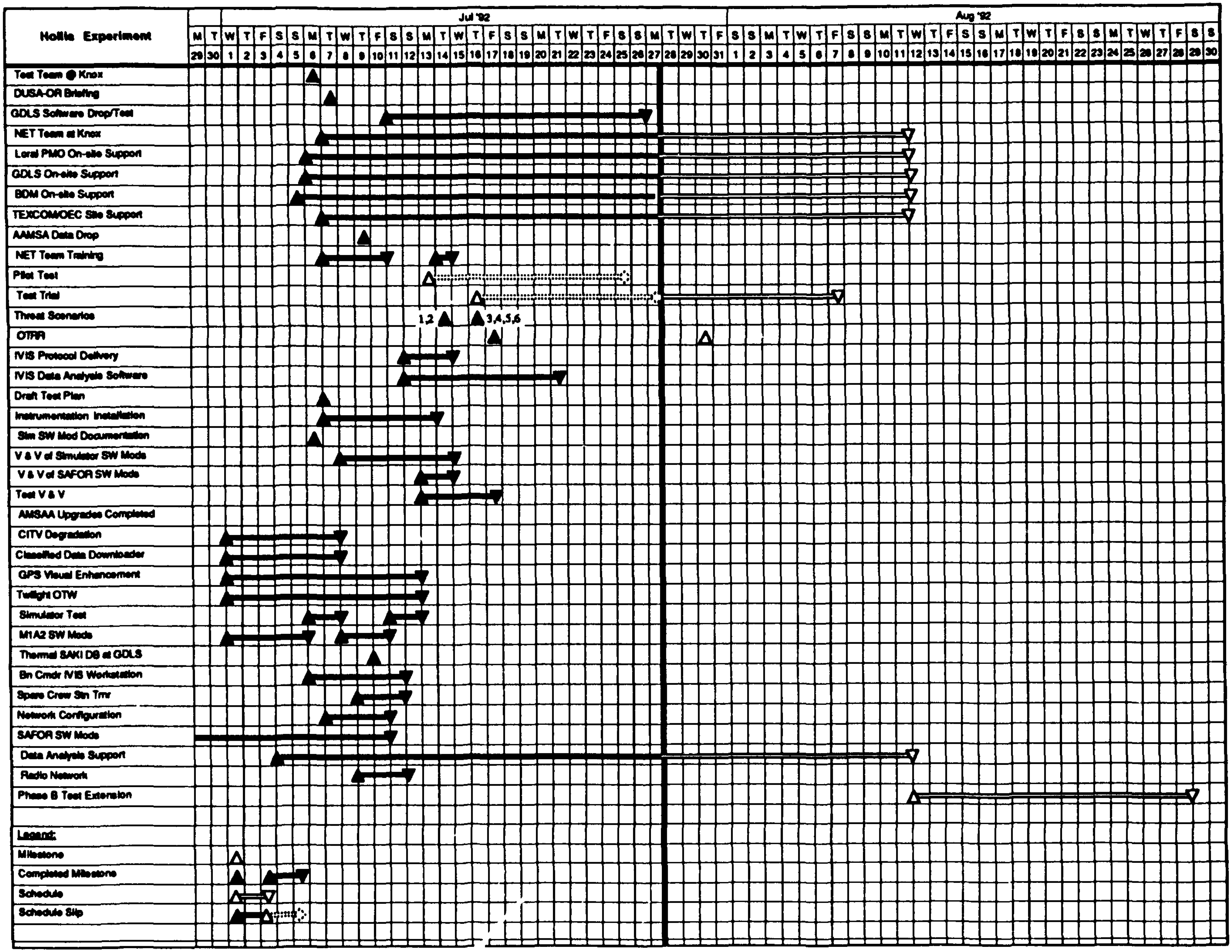


Exit Criteria or Objective

Quantify the operational effectiveness of the M1A2 subsystems by incrementally improving the M1A1 platform to the M1A2 platform by providing:

- **Test configurations of: M1A1, M1A1 w/ Pos/Nav, M1A1 w/ CITV, M1A2**
- **Software Upgrades to the M1A2 devices**
- **Software Upgrades to the Semi-Automated Forces detection tables**
- **Support test scenario generation**
- **Video/ test data instrumentation of the M1A21 devices by TECOM**
- **Engineering, Test Support, and Data Analysis services**

LORAL


Hollis Experiment
Jul '92
Aug '92
Test Team @ Knox
DUSA-OR Briefing
GDLS Software Drop/Test
NET Team at Knox
Loral PMO On-site Support
GDLS On-site Support
BDM On-site Support
TEXCOM/OEC Site Support
AAMSA Data Drop
NET Team Training
Pilot Test
Test Trial
Threat Scenarios
1,2
3,4,5,6
OTRR
IVIS Protocol Delivery
IVIS Data Analysis Software
Draft Test Plan
Instrumentation Installation
Sim SW Mod Documentation
V & V of Simulator SW Mods
V & V of SAFOR SW Mods
Test V & V
AMSAA Upgrades Completed
CITV Degradation
Classified Data Downloader
GPS Visual Enhancement
Twilight OTW
Simulator Test
M1A2 SW Mods
Thermal SAKI DB at GDLS
Bn Cmdr IVIS Workstation
Spare Crew Stn Trnr
Network Configuration
SAFOR SW Mods
Data Analysis Support
Radio Network
Phase B Test Extension
Legend:
Milestone
Completed Milestone
Schedule
Schedule Slip

IVIS Integration

Sponsor/POC	DCD Fort Knox / TBD	**Phone**	
STRICOM POC	John Collins	**Phone**	407-380-4382
Loral DO MGR	W. R. 'Mac' MacDiarmid	**Phone**	407-382-4583
Funding Source	TBD		
Schedule:	**Start** TBD	**Stop**	TBD

Project Description:

The Intervehicular Information System (IVIS) is an effort that explores the feasibility and proof of principle of linking three platforms — an Abrams Tank, a Bradley Fighting Vehicle, and an OH-58D helicopter — with an automated graphics display capability. This capability allows the transmission of a variety of command and control related reports, maps, and overlays electronically; these are then available to a crew member on a graphics display unit in the vehicles.

The Abrams tank and Bradley fighting vehicle simulators will be equipped with the IVIS; the OH-58 helicopter will be equipped with the Automatic Target Handoff System (ATHS) to support the evaluations.

Following the installation of all necessary hardware and software, experiments will be conducted to provide the data with which combat developers at the Armor School can evaluate the current capabilities and operational effectiveness of the combined arms team using the technologies represented by POSNAV, IVIS, and ATHS.

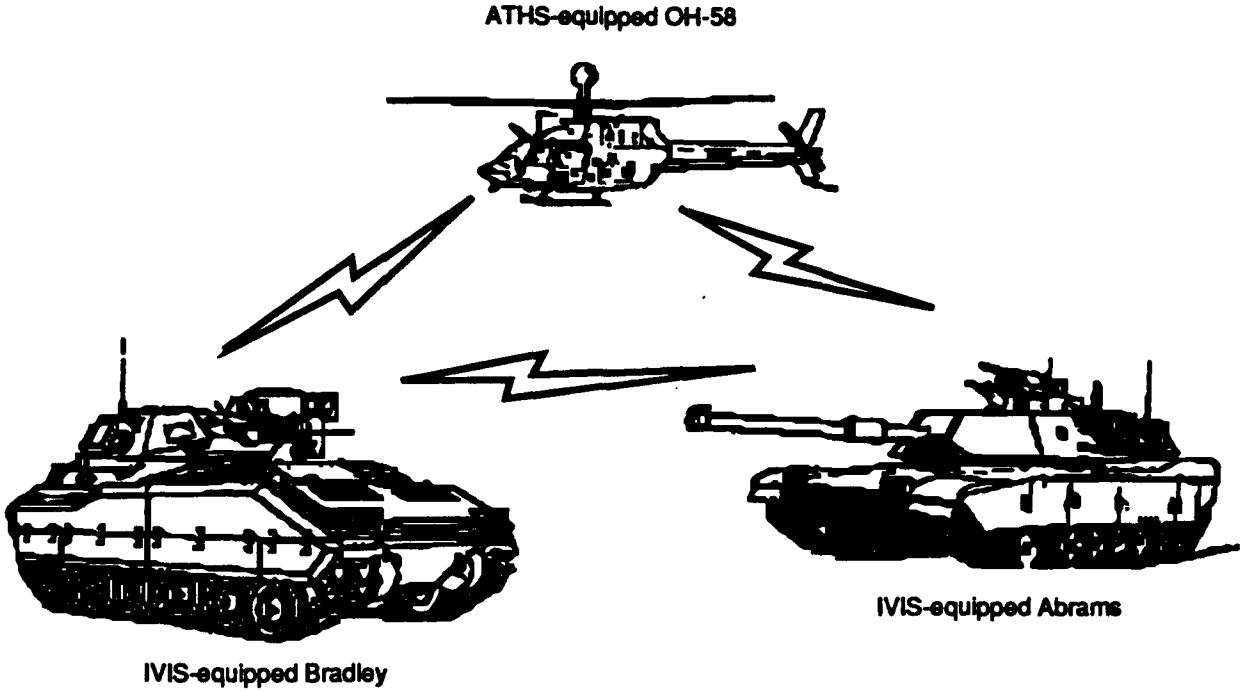
The effort will also examine the MANPRINT and soldier-battlefield task distribution among crew positions.

Project Status:

This effort has not yet been turned on. Originally, a Step One proposal was submitted to STRICOM in April 1992. Due to uncertainty over funding availability for a Step Two follow-on effort, the proposal was not acted on. Loral has been informed that a proof-of-principle demonstration is desired in October of 1992 and, as a result, the Government will probably award a Step Two effort based on ROM cost estimates generated at Fort Knox. There is a possibility that the Hollis studies that will be conducted at the CCTB at Fort Knox will impact the schedule of this effort in addition to others.

LORAL

IVIS Integration



Exit Criteria or Objective

- Install hardware and all necessary software to give all vehicles appropriate functional capabilities
- Provide Long Haul Network capabilities to support evaluations
- Collect data and prepare report to support analysis by CD personnel at the Armor School

LORAL

Land Systems Future Battlefield Design

Sponsor/POC	DARPA / MAJ Jim Wargo	**Phone**	703-845-6840
STRICOM POC	John Collins	**Phone**	407-380-4382
Loral DO MGR	W. R. 'Mac' MacDiarmid	**Phone**	407-382-4583
Funding Source	DARPA		
Schedule:	**Start** 15 November 1991	**Stop**	30 June 1992

Project Description:

The Land Systems Future Battlefield Design (LSFBD) Delivery Order comprised two discrete efforts. The first (the SIMNET-Janus Interconnectivity) is an investigation of a method for interconnecting manned simulators (SIMNET or BDS-D) and a closed-form analytical model, Janus-A. The Janus-A model was selected because of its general acceptance within the Combat Development community as a valid and accredited analytic tool. The objectives of this portion of the LSFBD DO were to develop a Design Data Handbook, a Functional Specification, and a Scenario Document. The overall goal is to investigate the feasibility of interconnecting manned simulators and the Janus simulation so that the SIMNET or BDS-D entities could interact on the Janus battlefield (but not necessarily the reverse).

The second part of the LSFBD DO is the Red Design Bureau. This effort defines in the Functional Requirements document the need for a synthetic, advance simulation environment for the evaluation of emerging threat developments, using the Soviet T-72 tank as the baseline threat platform. A Design Data Handbook defines the physical and functional capabilities of the T-72 and identifies potential research topics to be investigated in a proposed RDB simulation test bed. The Functional Specification, the third deliverable in this effort, defines the functional requirements for the two key elements of the simulation test bed: the virtual environment in which RDB developments will be tested and the RDB reconfigurable simulator that provides the port of entry for the human warfighter into the RDB virtual world.

Project Status:

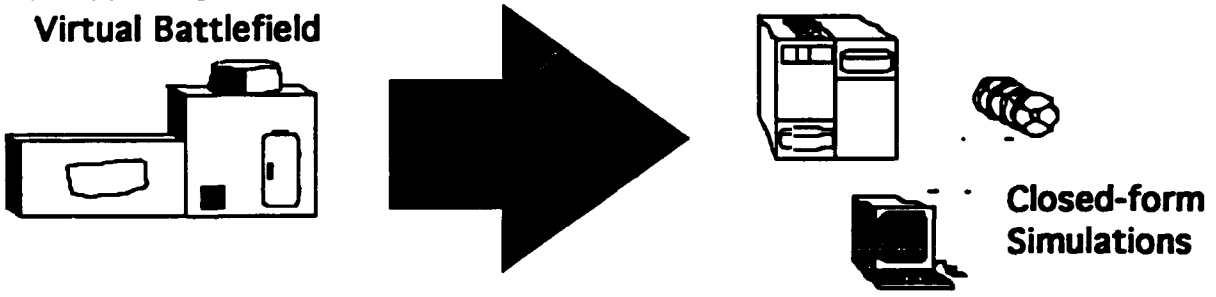
With the delivery of all six deliverables called for in the effort, the LSFBD is concluded.

LORAL

Land Systems Future Battlefield Design

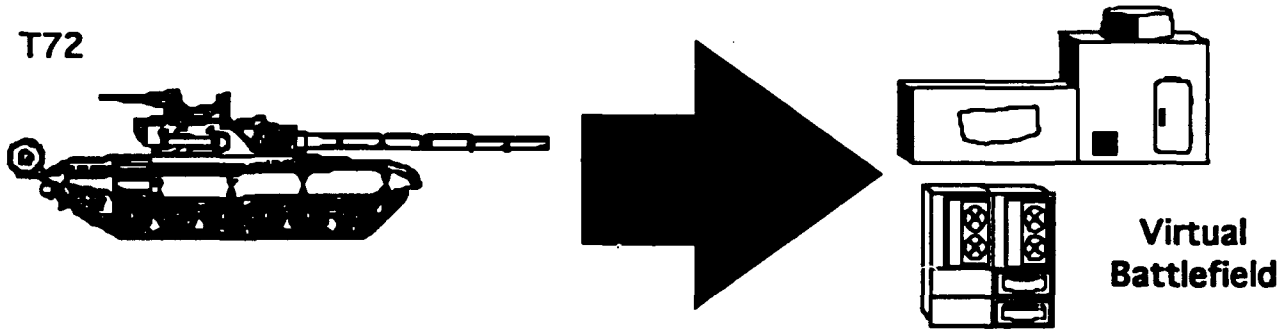
SIMNET-JANUS INTERCONNECTIVITY

Manned Simulators on Virtual Battlefield



RED DESIGN BUREAU

T72



Exit Criteria or Objective

SIMNET-Janus Interconnectivity
- Design Data Handbook
- Scenario Document
- Functional Specification

Red Design Bureau
- Functional Requirements
- Design Data Handbook
- Functional Specification

Land Sys Fut Btl Fld	Milestones	1991 Nov	1991 Dec	1992 Jan	1992 Feb	1992 Mar	1992 Apr	1992 May	1992 Jun	1992 Jul	1992 Aug	1992 Sept
Program Management	Contract Award	28 ▼										
	Kickoff Meeting		17 ▼									
Task 1, Red Design Bureau	Develop Funct. Reqts. Document				▲				▼			
	Deliver Funct. Reqts. Document								28 ▼			
	Develop Design Data Handbook					▲			▼			
	Deliver Design Data Handbook								28 ▼			
	Develop Functional Specs.						▲		▼			
	Deliver Functional Specs.								28 ▼			
	Government Review									▽		
	Government Acceptance									2 △		
Task 2, SIMNET-JANUS Interconnection	Develop Design Data Handbook				▲			▼				
	Deliver Design Data Handbook							20 ▼				
	Develop Scenario Document					▲		▼				
	Deliver Scenario Document								6 ▼			
	Develop Funct. Reqts. Document						▲		▼			
	Deliver Funct. Reqts. Document								28 ▼			
	Government Review									▽		
	Government Acceptance									2 △		

Fort Leavenworth Node

Sponsor/POC	CAC / LTC Russ Baldwin	**Phone**	913-684-3802
STRICOM POC	John Collins	**Phone**	407-380-4382
Loral POC	W. R. 'Mac' MacDiarmid	**Phone**	407-382-4583
Funding Source	STRICOM		
Schedule:	**Start** 29 April 1992	**Stop**	30 September 1992

Project Description:

The Fort Leavenworth Node Delivery Order is a Step One effort that will investigate the requirements associated with establishment of a BDS-D node at Fort Leavenworth, KS. Following a determination of the requirements and their approval by the Combined Arms Command and tenant organizations at Fort Leavenworth, an analysis will be made to determine the technical feasibility of incorporating those requirements into an implementation phase (Step Two). In addition to determining the feasibility, a cost analysis will be conducted and a proposed schedule developed to support recommendations made. The results of these analyses, the proposed schedule, and recommendations will be incorporated, along with a proposed technical approach, in the final report.

The methodology for accomplishing the Step One is phased. The first phase is the requirements definition. This definition is based on in-depth interviews with various agencies who anticipate subscribing to the BDS-D node. Once the requirements have been validated, the Loral team (which includes BDM and IEI), will develop the approach, costs, and schedule for satisfying the validated requirements.

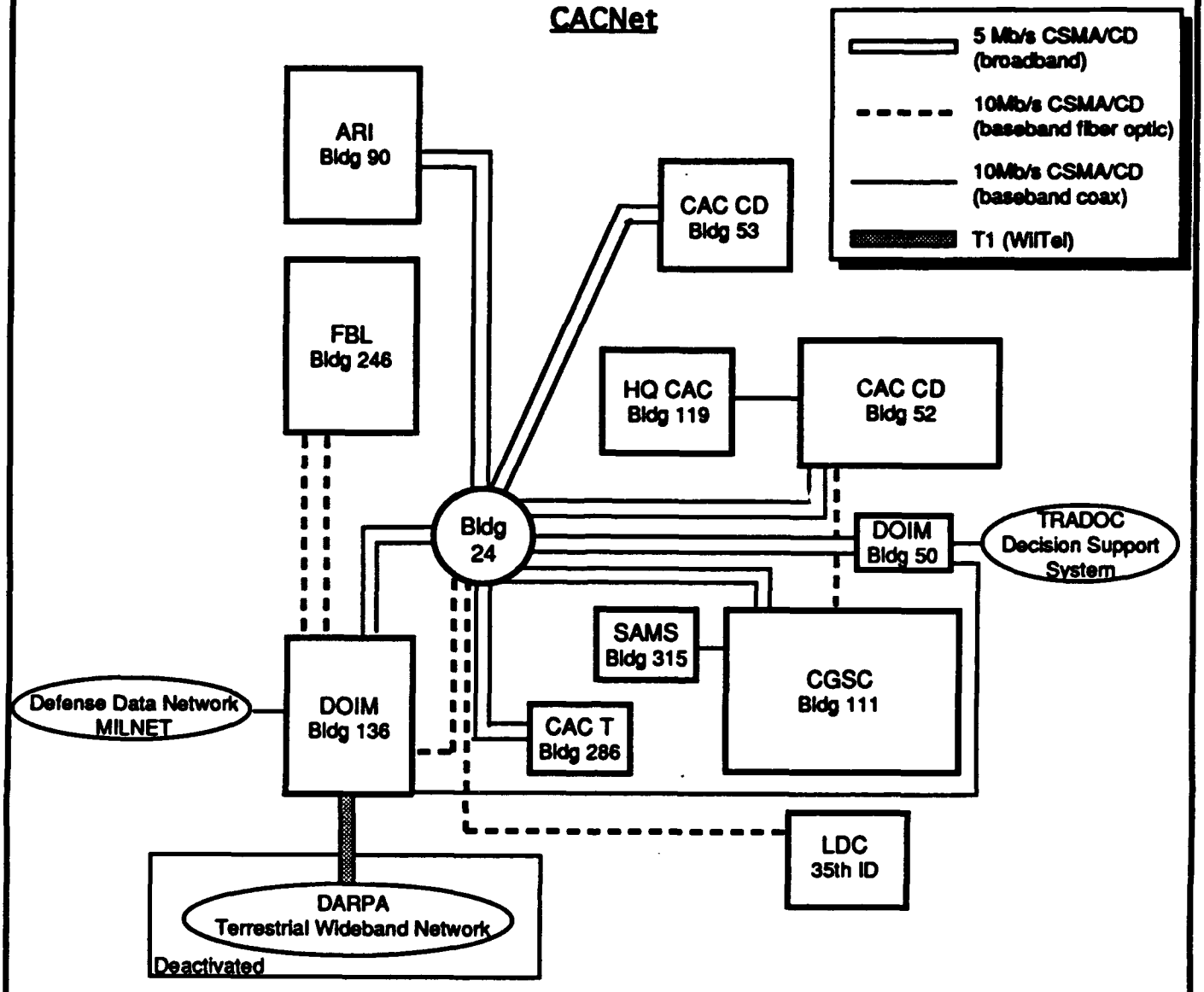
The BDS-D node will be developed on top of the existing CACNet currently in place at Fort Leavenworth.

Project Status:

Prior to formal turn-on of this effort, a kickoff meeting and data collection interviews with representatives of CAC agencies were conducted at Fort Leavenworth in mid-March. Following the official turn-on, the analysis team developed a draft report on the requirements for the Fort Leavenworth node and submitted it to the Government in June. The draft is currently being staffed at Fort Leavenworth, with responses due back to CAC on 10 July. Following that, a second meeting is tentatively planned to discuss the requirements and Government comments, so that the second phase of the effort can begin.

LORAL

CACNet



Exit Criteria or Objective

- Develop Requirements for a BDS-D Node at Fort Leavenworth
- Build upon Existing CACNet
- Determine Feasibility of Implementation of Node
- Develop a Proposed Approach, Cost and Schedule for Implementation

Fort Leavenworth Node Schedule

Tasks	Milestones	1992										
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Step One FAS	Step One Award			29								
	Kickoff Meeting		18									
	Develop Requirements Definition											
	Submit Reqts. Def.											
	Gov't Review					11						
	Develop Specs/Sched./Cost Analysis											
	Submit Specs./Tech. Report											
	Gov't Review								2			
	Revise											
	Submit Final Report									4		

Line-of-Sight Anti-Tank

Sponsor/POC	PM LOSAT / Greg Tackett	**Phone**	(205) 842-0847
STRICOM POC	John Collins	**Phone**	(407) 380-4382
LORAL POC	Tom Radgowski	**Phone**	(502) 942-1092
Funding Source	PM LOSAT / STRICOM		
Schedule: **Start**	FY 93	**Stop**	FY 93

Project Description:

Examine issues regarding the development of the Line-of-Sight Anti-Tank (LOSAT) weapon system. LOSAT is a replacement for the ITV. It is designed to carry hypervelocity missiles on a modified Bradley chassis and can acquire and destroy armored targets at extended ranges.

This test requires borrowing components from another simulator (e.g., CIG). Additional funding will be made available to reconfigure the LOSAT crew compartment to simulate the LOSAT baseline configuration once LTV designs the actual system.

Project Status:

Conversations with Greg Tackett, LOSAT Program Engineer, indicate that PM LOSAT is interested in conducting additional developmental testing during FY '93. The schedule and scope of these tests have not yet been determined.

LORAL

Line-of-Sight Anti-Tank

LOSAT schedule and network configuration are not currently available. They will be confirmed following budget discussion currently underway between STRICOM and PM LOSAT.

Exit Criteria or Objective

Inputs from LOSAT development may include advancements in:

- Crewed Simulators
- Semi-Automated Forces
- Simulator Network Fidelity

LORAL

LOSAT Schedule
not available
at this time.

MIA2
Training Developments

Sponsor/POC	PM Tank - GDLS / Dan Motola	**Phone**	(313) 825-5693
STRICOM POC	John Collins	**Phone**	(407) 380-4382
LORAL POC	Tom Radgowski	**Phone**	(502) 942-1092
Funding Source	PM Tank / GDLS		
Schedule: **Start**	January 1991	**Stop**	January 1993

Project Description:

GDLS is under contract to PM Tank to upgrade 4 CCTB M1 simulators to the M1A2 configuration. They have incorporated simulations of the Commander's and Driver's Integrated Displays, the Commander's Independent Thermal Viewer, and the Gunner's Control and Display Panel into the simulators and reworked the performance characteristics to resemble the M1A2. These vehicles will be at the disposal of the Armor Center.

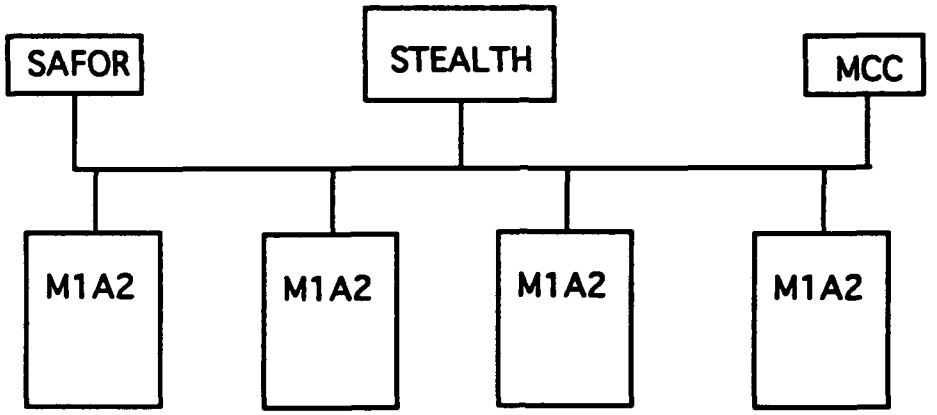
CCTB has been providing field engineer support to help integrate the new components into the vehicles. CCTB will provide board level troubleshooting of the CDLS components for the duration of the GDLS hardware support contract (18 months). GDLS will pay for the shipment and repair of these components.

Project Status:

These vehicles have been reconfigured to support the M1A2 comparative analysis, also known as the Hollis Study. Ft. Knox will have to determine which of thesae changes, if any, will remain once the test is complete.

LORAL

M1A2 Training Developments Net



Exit Criteria or Objective

Inputs from M1A2 Training Developments Activity test may include advancements in:

- Interaction With Real World Systems
- Simulation with Different Levels of Fidelity

LORAL

M1A2 Schedule
not available
at this time.

MultiRad - War Breaker

Sponsor/POC	USAF Capt. Lisa Brown	**Phone**	602 988-6561
STRICOM POC	John Collins	**Phone**	407 380-4382
Loral POC	Jim Exter	**Phone**	407 382-4595

Funding Source U. S. Air Force / DARPA

Schedule: **Start** July 1991 **Stop** July 1993

Project Description:

The MULTIRAD/War Breaker Delivery Order is an important element of the Advanced Distributed Simulation Technology Contract because it provides for networked extensions to Air Force weapon systems as part of the networked Simulation Battle Field environment. Elements represented include both fixed wing, F-16 and F-15, Unmanned Air Vehicles (UAV), JSTARS and Airborne Radar AWACS, as part of the DOD networked simulation assets. The on-going Network Interface Unit (NIU) development is particularly important in linking non-SimNet systems to the SimNet Network as well as interfacing dissimilar Simulation Fidelity Simulators. The linking of existing simulation assets utilizing NIU capabilities is critical for affordable simulation network extension.

The MULTIRAD/War Breaker Delivery Order contains the Knowledge Acquisition Prototype Testbed Aerospace Node KAPTAN work statement requiring long haul connections between the Armstrong Laboratory and remote sites including the Institute for Defense Analysis (IDA), McDonnell Aircraft Company, St. Louis, Hanscom, AFB., Ft. Rucker, Al,and the Joint Development Facility (JDF) in McClane, Va. Phase 1 of the War Breaker initiative is a reconstruction of the of the last days of Operation Desert Storm and specifically the U.S. Armed Forces mission to eliminate IRAQ's SCUD missiles. As a follow-on to the 73 Easting recreation of pivotal ground force action in Southwest Asia, War Breaker will provide an important combat development testbed for researching tactics and procedures involved in detection and neutralization of critical mobile targets

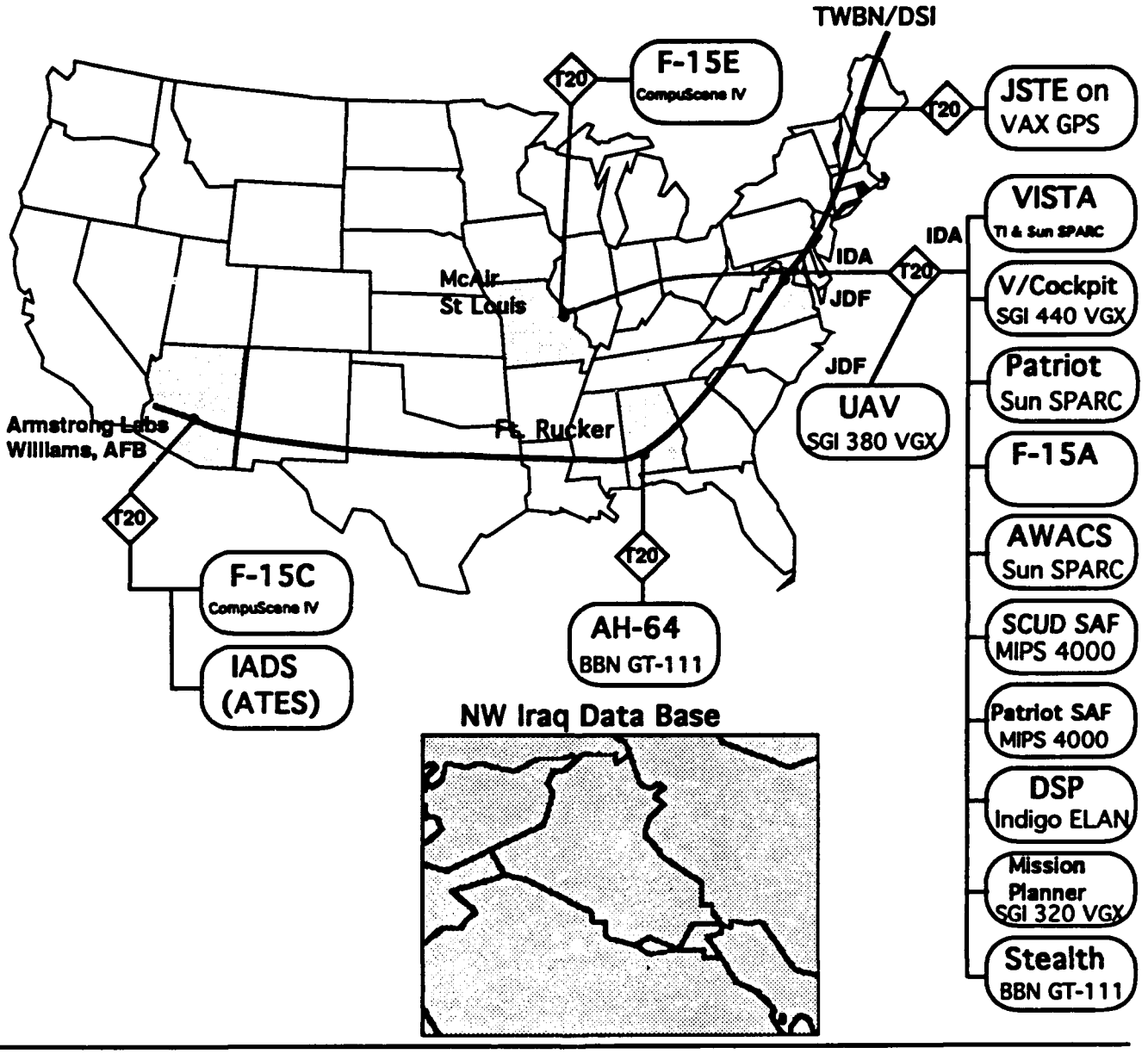
Project Status:

The second year extension to the Multirad should be definitized on July 29, 1992. The period of performance is one year and includes the War Breaker activity to network simulations at several remote sites including IDA, Hanscom, AFB., McAir in St. Louis, and Ft. Rucker with systems at Armstrong Laboratory.

LORAL

MultiRaD - War Breaker

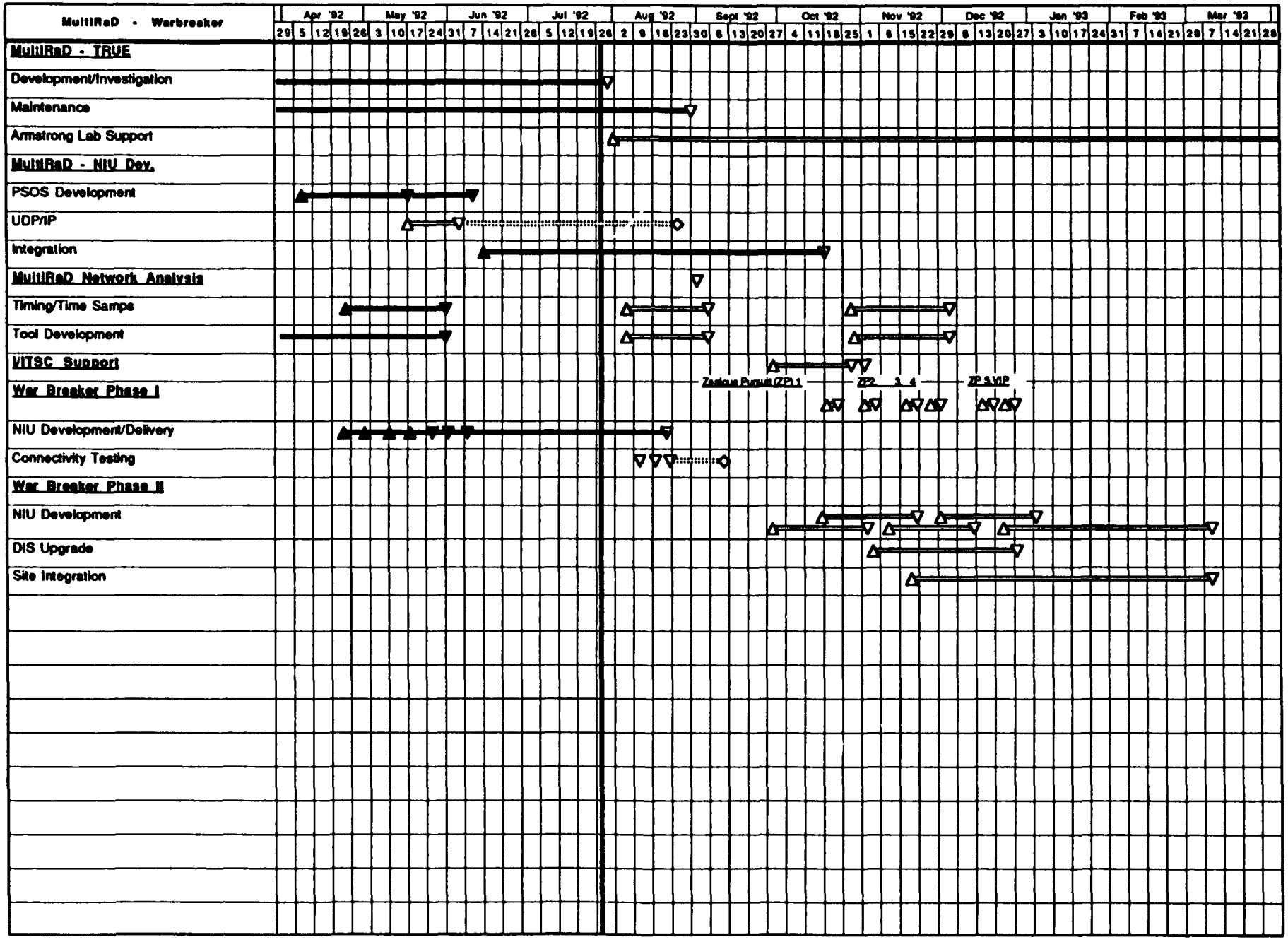
War Breaker Phase 1



Exit Criteria or Objective

- Disimilar Fidelity Simulations
- Wide Area Networking
- Secret Classification
- Dis Protocol (2.0 - Goal)
- Last Days Desert Storm Recreation
- Scud Hunting Tactics Eval

LORAL


MultiRaD - Warbreaker
Apr '92
May '92
Jun '92
Jul '92
Aug '92
Sept '92
Oct '92
Nov '92
Dec '92
Jan '93
Feb '93
Mar '93
29 5 12 19 26 3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 6 13 20 27 4 11 18 25 1 8 15 22 29 6 13 20 27 3 10 17 24 31 7 14 21 28 7 14 21 28
MultiRaD - TRUE
Development/Investigation
Maintenance
Armstrong Lab Support
MultiRaD - NIU Dev.
PSOS Development
UDP/IP
Integration
MultiRaD Network Analysis
Timing/Time Samps
Tool Development
VITSC Support
War Breaker Phase I
NIU Development/Delivery
Connectivity Testing
War Breaker Phase II
NIU Development
DIS Upgrade
Site Integration

NON-LINE OF SIGHT, PHASE 2 (NLOS 2)

Sponsor/POC PM NLOS / Brian Wheeler **Phone** (205) 842-8670

STRICOM POC Bryant LaFoy **Phone** (407) 380-4353

LORAL POC Greg Kanies **Phone** (407) 382-4596

Funding Source PM NLOS

Schedule: **Start** TBD **Stop** _____

Project Description:

This Delivery Order will support the conduct of the NLOS 2 experiment which will collect and evaluate data regarding the combined arms employment of the NLOS weapons system with specific emphasis on the anti-armor employment of this system.

To facilitate this, the following Airnet enhancements are being considered:

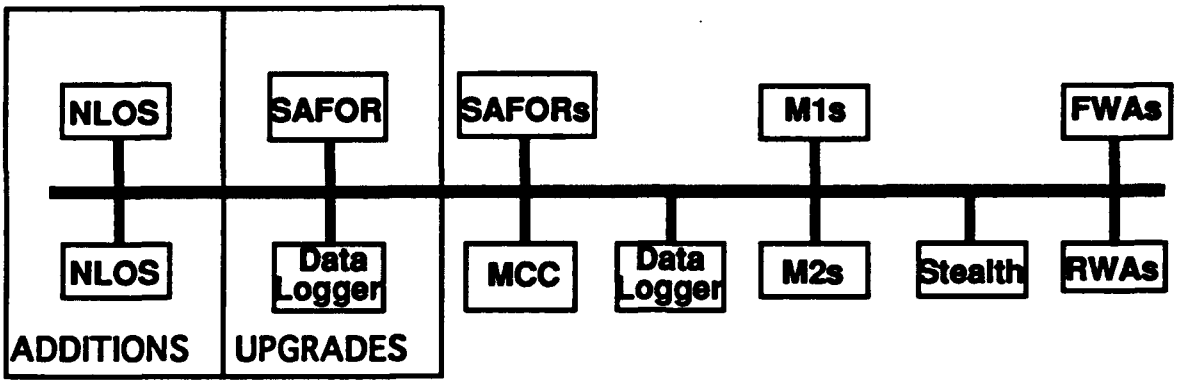
- Software Upgrades to the NLOS devices
- Software Upgrades to the Semi-Automated Forces
- Procurement of an Computer Image Generators
- Procurement of additional SAFOR and Data Logger systems

Project Status:

LORAL is preparing a development plan in response to the NLOS 2 requirements received from STRICOM and PM NLOS.

LORAL

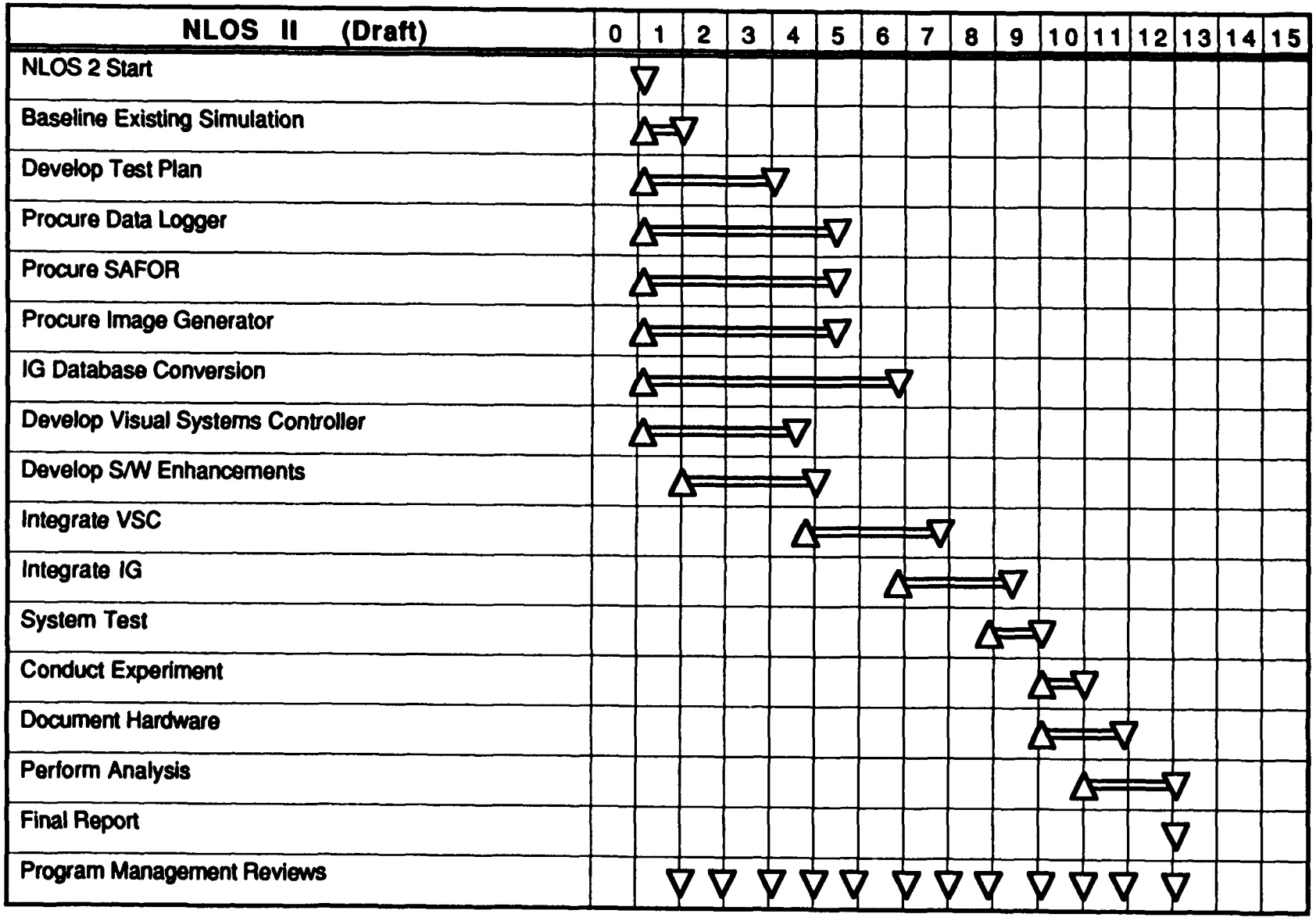
NLOS, Phase 2



AIRNET

Exit Criteria or Objective

- Enhance the capabilities of the Aviation Test Bed facility
- Conduct the NLOS 2 experiment and document the results


NLOS II (Draft)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
NLOS 2 Start
Baseline Existing Simulation
Develop Test Plan
Procure Data Logger
Procure SAFOR
Procure Image Generator
IG Database Conversion
Develop Visual Systems Controller
Develop S/W Enhancements
Integrate VSC
Integrate IG
System Test
Conduct Experiment
Document Hardware
Perform Analysis
Final Report
Program Management Reviews

Smart Minefield Simulator

Sponsor/POC	IDA / Richard Carpenter	**Phone**	703-845-6840
STRICOM POC	John Collins	**Phone**	407-380-4382
Loral POC	W. R. 'Mac' MacDiarmid	**Phone**	407-382-4583
Funding Source	DARPA		
Schedule: **Start**	TBD	**Stop**	30 September 1992

Project Description:

The Smart Minefield Simulator is a follow-on to previous efforts sponsored by IDA under the Wide Area Mines (WAMS) program. The FY92 portion of the SMS effort will build a simulation that allows the use of conventional as well as rudimentary wide area mines (WAM) and anti-helicopter mines (AHM) to be played on the BDS-D battlefield. The wide area mine is composed of a sensor, a fire control system, and a munition. The sensor tracks the two closest vehicles within its detection range. When certain parameters are met, the fire control system fires the munition which flies in a parabolic path and then is guided to the primary target. The AHM is a variation of the WAM.

The simulation will also support at least four methods of emplacement, including specification of individual mine locations, specification of a randomly-filled area, specification of a randomly-filled line, or emplacement by artillery.

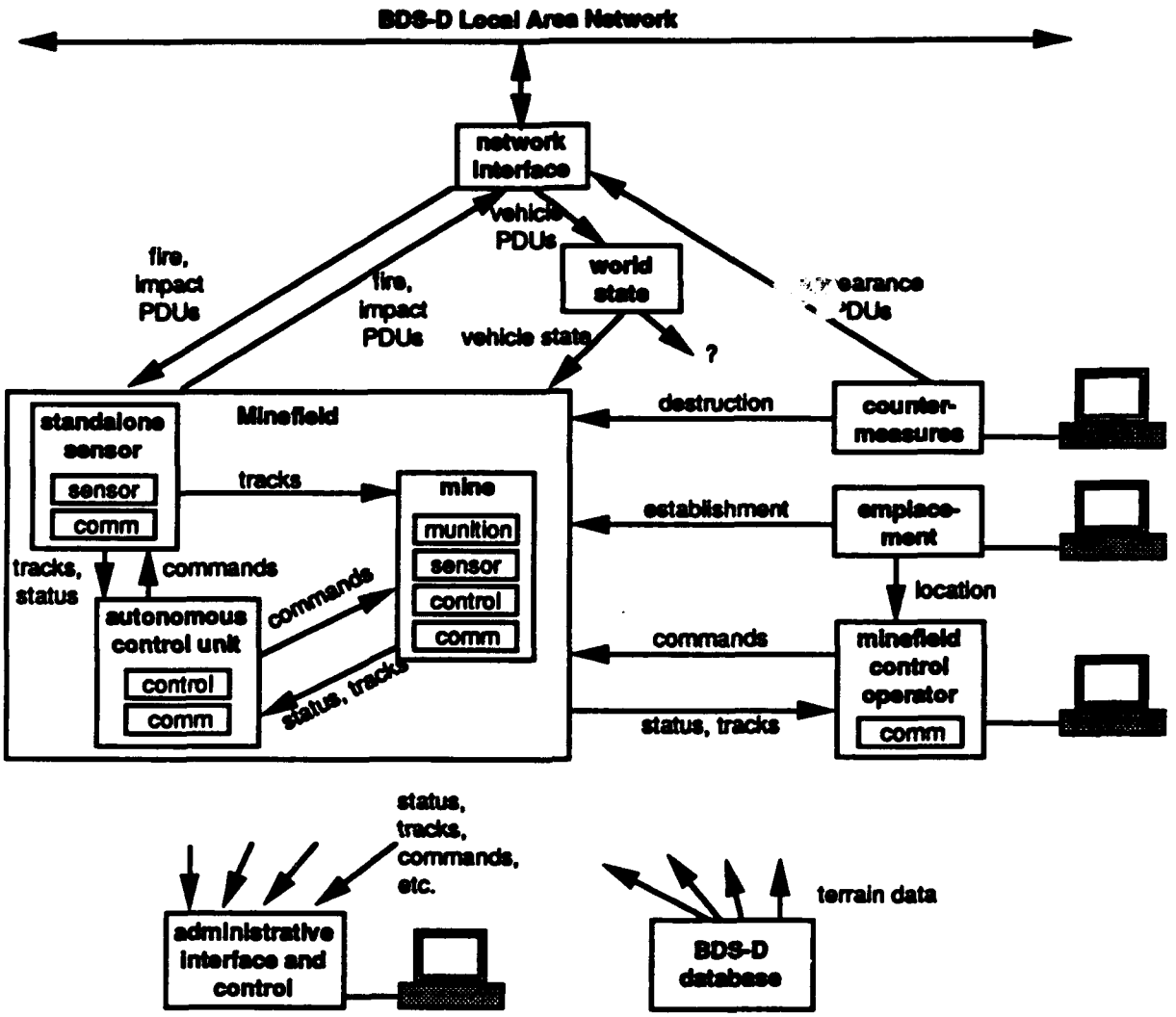
Once the simulation has been developed, two one-week tests will be scheduled at the CCTB at Fort Knox. These tests will involve only SAFOR; no manned simulators will be involved. Once the results of the tests are analyzed, IDA will make decisions on the future development of the SMS for FY93, to include objectives and test requirements.

Project Status:

Although this effort has yet to be formally turned on, STRICOM gave approval to begin work with a NTE cost of $10K. This allowed Loral to schedule a kickoff meeting which was held at IDA on 17 June. The kickoff meeting gave Loral team members the opportunity to meet with the IDA personnel involved in the effort, clarify certain management and technical issues, and receive guidance from the IDA project leaders. STRICOM has also directed Loral to revise the original proposal to include provisions for purchase of additional hardware items and spares necessary to execute the effort.

LORAL

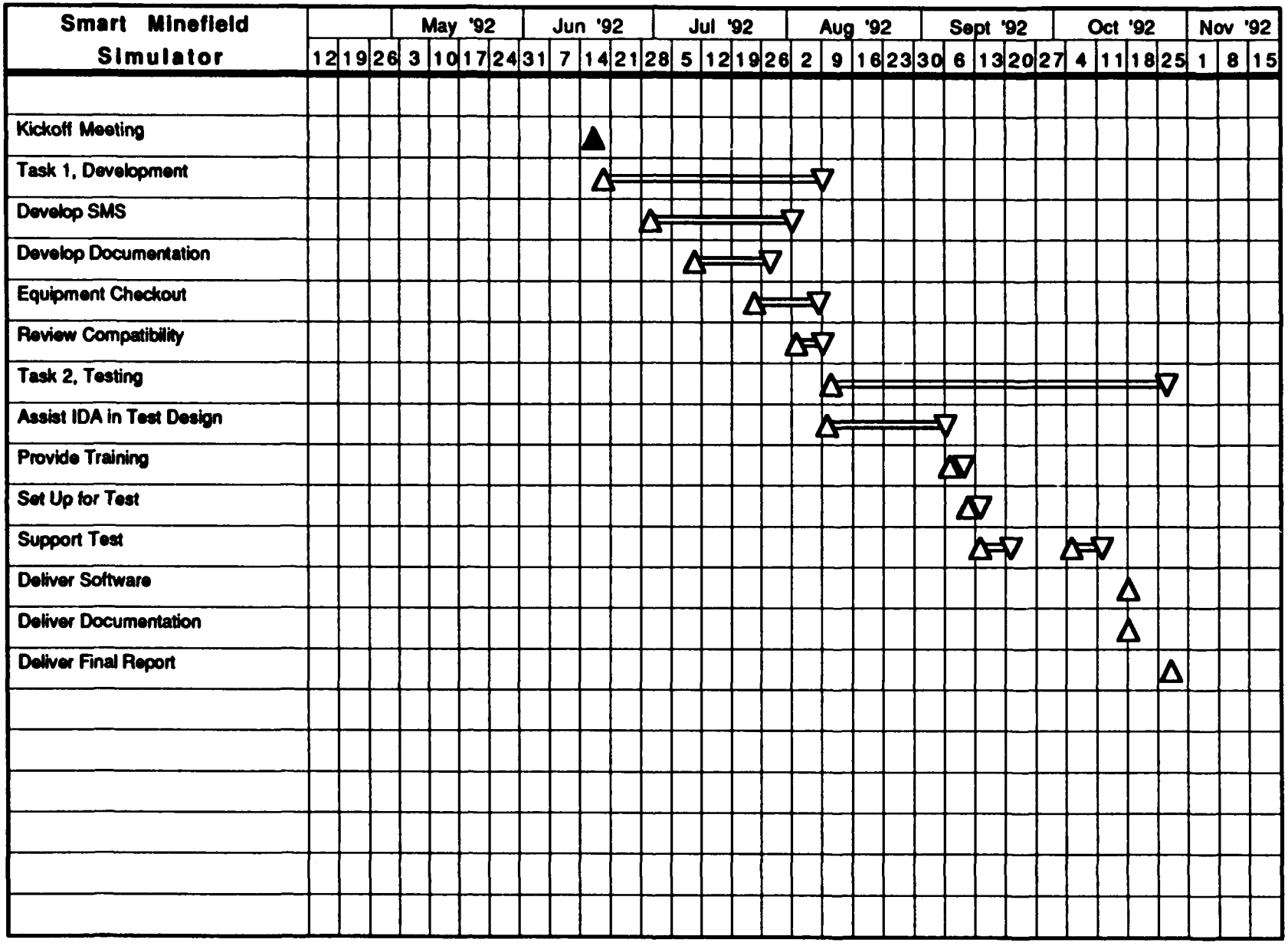
Smart Minefield Simulator



- Administrative control has access to all components
- All modules can access BDS-D database, specifically terrain

Exit Criteria or Objective

- Develop SAFOR-based Smart Minefield Simulator
- FY92 objectives call for conventional mine, WAM, and AHM
- Develop appropriate user interfaces
- Conduct two one-week tests of the simulation
- Develop recommendations for FY93 objectives


Smart Minefield Simulator
May '92
Jun '92
Jul '92
Aug '92
Sept '92
Oct '92
Nov '92
12 19 26 3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 6 13 20 27 4 11 18 25 1 8 15
Kickoff Meeting
Task 1, Development
Develop SMS
Develop Documentation
Equipment Checkout
Review Compatibility
Task 2, Testing
Assist IDA in Test Design
Provide Training
Set Up for Test
Support Test
Deliver Software
Deliver Documentation
Deliver Final Report

Software Contract Change Proposal

Sponsor/POC	STRICOM / Stan Goodman	**Phone**	(407) 380 - 8165
STRICOM POC	John Collins	**Phone**	(407) 480 - 4382
Loral POC	Richard Bright	**Phone**	(408) 473 - 7011

Funding Source STRICOM

Schedule: **Start** 1 September 1992 (tentative) **Stop** 31 March 1993

Project Description:

The Software Contract Change Proposal (SW CCP) was originally designed to provide the following support in maintaining and upgrading SIMNET software and documentation:

1. Management - provide the planning documents, attend government meetings, support acquisition of hardware, configure hardware, coordinate project resources, and subcontract management.
2. Software CM - install SIMNET 6.6.1 code baselines, develop a CM plan, expand support as the program grows, and provide baseline maintenance for development efforts.
3. Software maintenance - identify, document and repair software problems, provide yearly upgrades,perform regression testing.
4. Software documentation - develop and maintain a consistent set of documentation for all BDS-D sites.
5. Software QA - comply with the SW quality Assurance plan.
6. ADP Support - equipment installation, preventive maintenance, configuration of the operating system, and installation of upgrades as required.
7. Government Property Control - tag GFE equipment, maintain records, provide an interface to DCAS, and support PCA.
8. Site Backup Support - develop software, documentation and procedures to support maintenance at Fort Rucker and Fort Knox.

Subsequent reductions and delays in funding have resulted reducing the scope of work to the following tasks:

1. Management - provide the planning documents, attend government meeting, support acquisition of hardware, configure hardware, coordinate project resources, and subcontract management.
2. Software CM - install SIMNET 6.6.1 code baselines, develop a CM plan, expand support as the program grows, and provide baseline maintenance for development efforts.
3. ADP Support - equipment installation, preventive maintenance, configuration of the operating system, and installation of upgrades as required.
4. Government Property Control - tag GFE equipment, maintain records, provide an interface to DCAS, and support PCA.

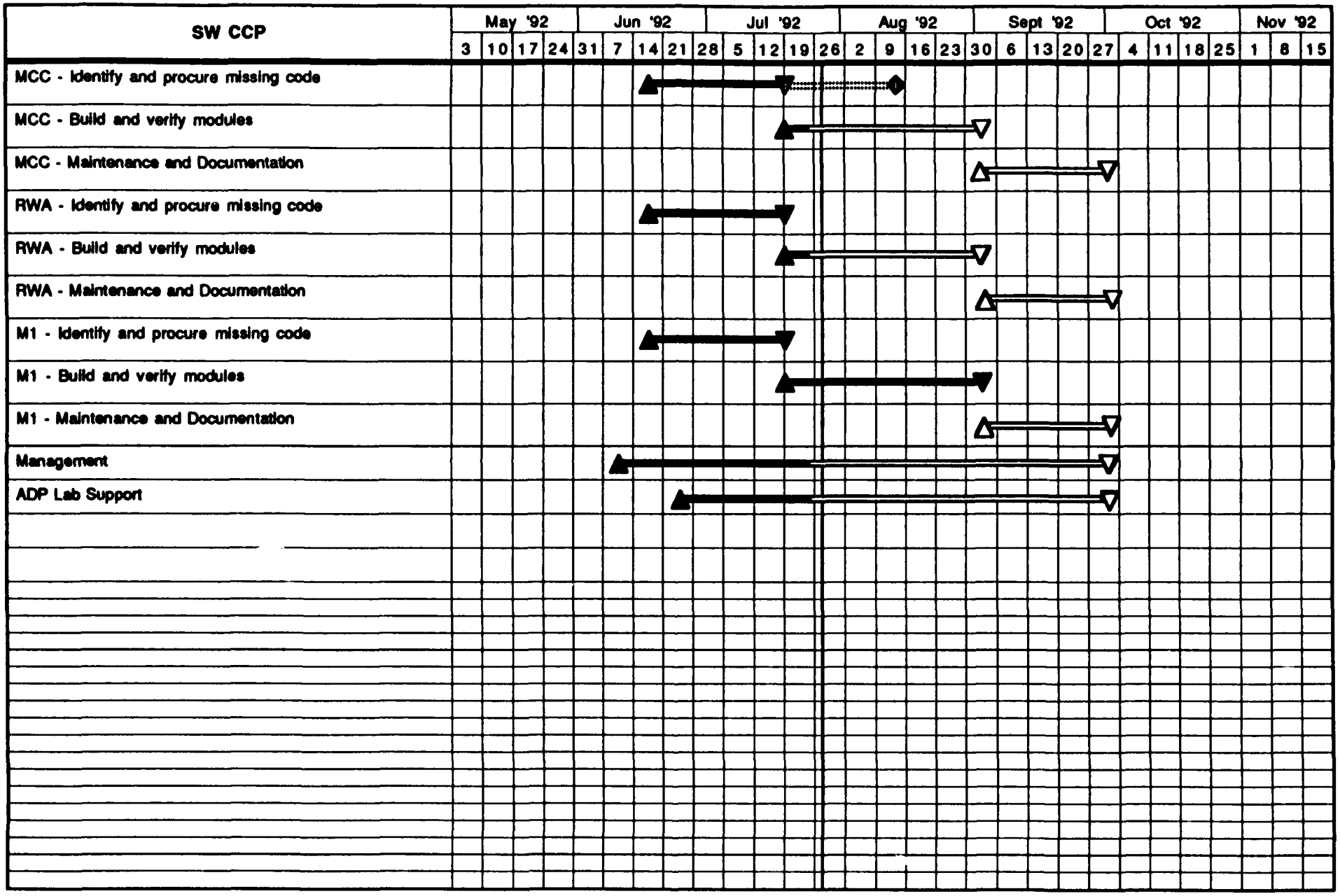
Project Status:

Continued delays in funding have resulted impacts to the AirNet and XROD delivery orders. In order to ensure program continuity Loral funded a 3 month effort, at risk, with the following objectives:

- procure missing software from BBN for AirNet
- procure missing software from BBN for RWA
- procure missing software from BBN for the M1
- build the software in the Software Development Facility (SDF) located in San Jose
- document these build procedures

To date substantial progress in achieving these objectives has been realized.

LORAL


SW CCP
May '92
Jun '92
Jul '92
Aug '92
Sept '92
Oct '92
Nov '92
3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 6 13 20 27 4 11 18 25 1 8 15
MCC - Identify and procure missing code
MCC - Build and verify modules
MCC - Maintenance and Documentation
RWA - Identify and procure missing code
RWA - Build and verify modules
RWA - Maintenance and Documentation
M1 - Identify and procure missing code
M1 - Build and verify modules
M1 - Maintenance and Documentation
Management
ADP Lab Support

X-Rod Experiment

Sponsor/POC	ARDEC/Walt Townsend	**Phone**	(201) 724-7197
STRICOM POC	John Collins	**Phone**	(407) 380-4382
Loral POC	Bob Marraccini	**Phone**	(408) 4873-5041
Funding Source	ARDEC, DARPA		
Schedule: **Start**	4 May 1992 (Phase II)	**Stop**	30 April 1993 (revised)

Project Description:

The X-ROD is a tank-fired anti-armor weapon system development effort managed jointly by the U.S. Army Armament Research, Development and Engineering Center (ARDEC), DARPA and the US Army. The X-Rod is a 120mm guided kinetic energy projectile designed for extended ranges and high lethality and very high P(h) an P(k) against advanced armored threats.

When the X-Rod BDS-D experiment was initially conceived, two competing X-Rod designs (Fire-and-Forget and Command Guided) were under evaluation and the BDS-D objective was to evaluate each in the soldier-in-the-loop simulation environment. The results will be used to compare each of these methods with one another and against a baseline condition.

The X-Rod/BDS-D project has two phases: Phase 1 to develop specifications, test plan and an approach for Phase 2. During Phase 1, it became apparent that detailed subsystem specs (needed to accurately model competing designs) were not available, and the Command Guided Approach was to be canceled due to funding cuts. So the BDS-D experiment objective was modified to implement a single Fire-and-Forget model, and use the CCTB to allow investigations of the X-Rod equipped M1 Vehicle relative to the performance of conventional main gun munitions in a simulated combat environment. This approach will provide the required concept evaluation data in a time frame which still meets the needs of ARDEC and DARPA.

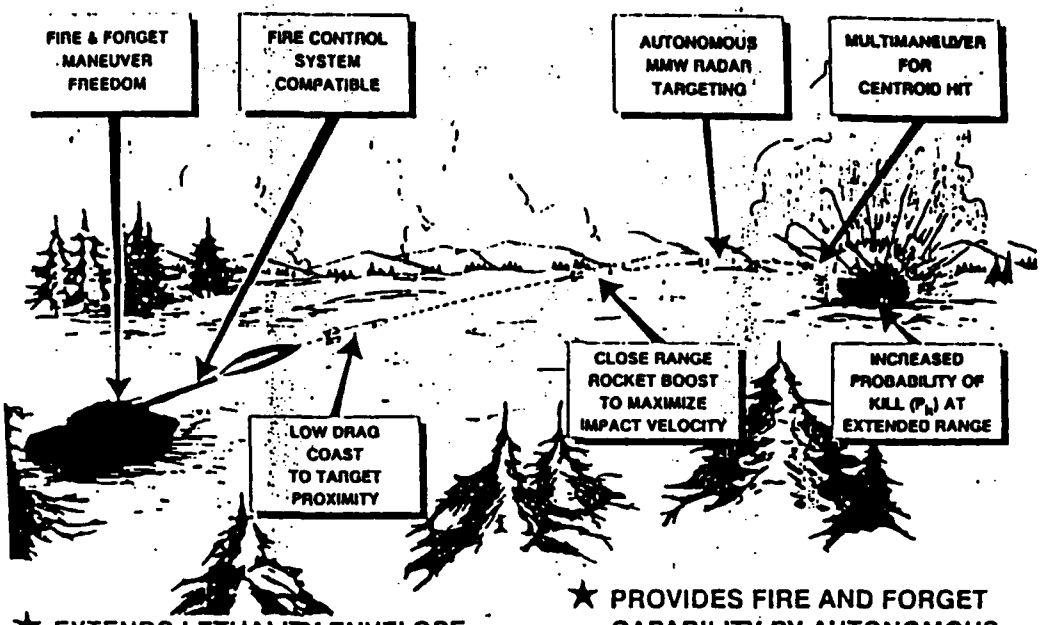
The types of data that are expected from this test will support examination of the effects of X-Rod in the areas of friendly force preservation, lethality, and crew performance in comparison to that level of performance afforded by conventional tank main gun munitions.

Project Status:

Phase 2 tasks not requiring use of GFE have proceeded on schedule. Due to approximately a 2 month delay in receipt of GFE at WDL and subcontractors facilities, software/hardware development tasks and related documentation and test activities at Ft. Knox have slipped accordingly.

LORAL

X-ROD



★ EXTENDS LETHALITY ENVELOPE OF TANK.

★ IMPROVES PROBABILITY OF HIT (P_h) OVER RANGE.

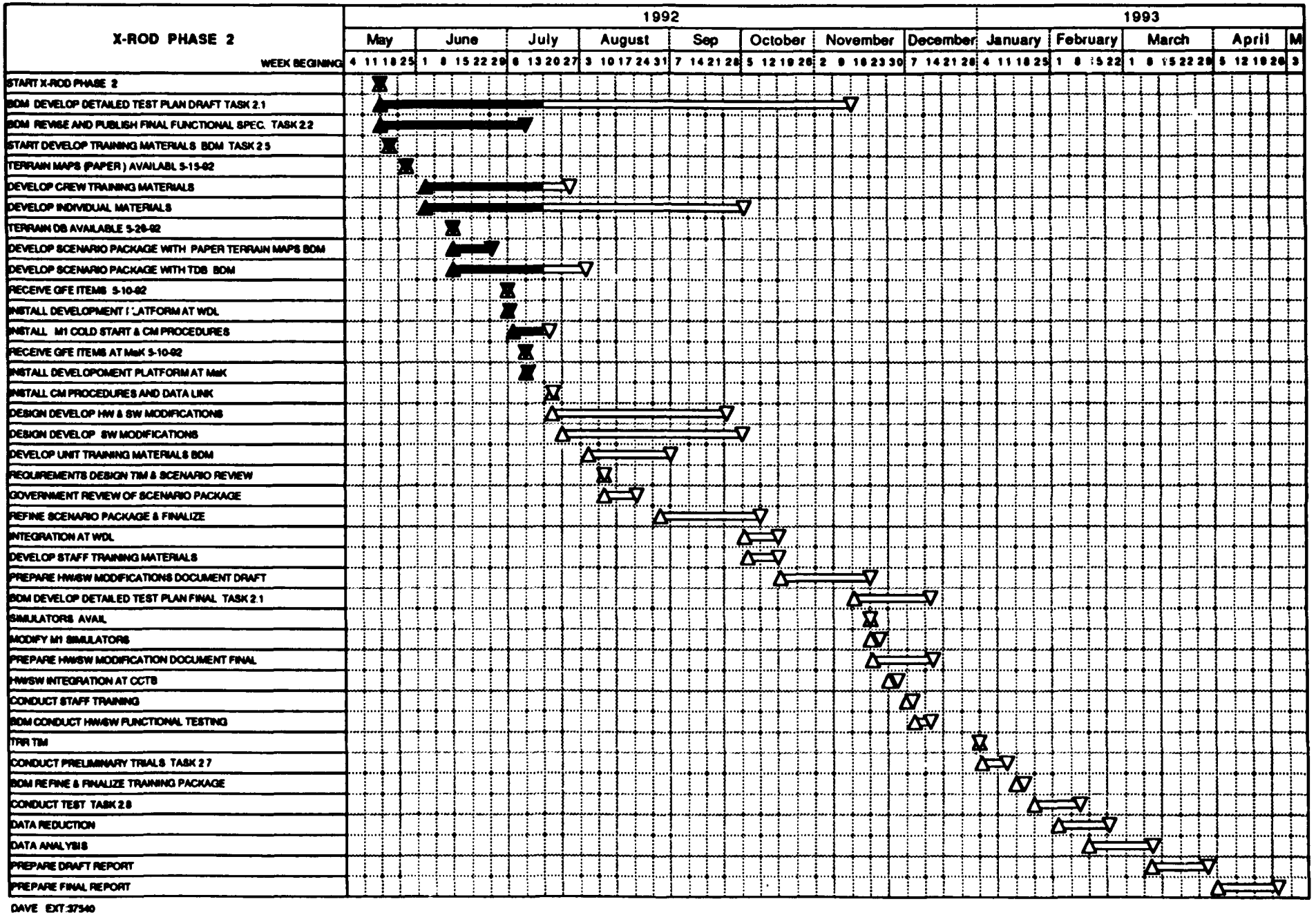
★ PROVIDES FIRE AND FORGET CAPABILITY BY AUTONOMOUS PROJECTILE GUIDANCE.

★ IMPROVES SYSTEM AND FORCE EXCHANGE RATIOS.

Exit Criteria or Objective

Specific X-Rod Experiment Objectives are:

1. Determine the battlefield contribution of X-Rod in the context of simulated combat scenarios.
2. Assess the implications of X-Rod vs tank basic load (main gun).
3. Examine the potential impact of X-Rod on small-unit armor tactics.
4. Investigate soldier-machine-interface (SMI) aspects of the X-Rod design concept.
5. Assess the capability of BDS-D technology to support development of conceptual weapon systems.


X-ROD PHASE 2
1992
1993
May
June
July
August
Sep
October
November
December
January
February
March
April
WEEK BEGINING
4 11 18 25 1 8 15 22 29 6 13 20 27 3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 7 14 21 28 4 11 18 25 1 8 15 22 1 8 15 22 29 5 12 19 26
START X-ROD PHASE 2
BDM DEVELOP DETAILED TEST PLAN DRAFT TASK 2.1
BDM REVISE AND PUBLISH FINAL FUNCTIONAL SPEC. TASK 2.2
START DEVELOP TRAINING MATERIALS BDM TASK 2.5
TERRAIN MAPS (PAPER) AVAILABL 5-15-92
DEVELOP CREW TRAINING MATERIALS
DEVELOP INDIVIDUAL MATERIALS
TERRAIN DB AVAILABLE 5-26-92
DEVELOP SCENARIO PACKAGE WITH PAPER TERRAIN MAPS BDM
DEVELOP SCENARIO PACKAGE WITH TDB BDM
RECEIVE GFE ITEMS 5-10-92
INSTALL DEVELOPMENT PLATFORM AT WDL
INSTALL M1 COLD START & CM PROCEDURES
RECEIVE GFE ITEMS AT MsK 5-10-92
INSTALL DEVELOPOMENT PLATFORM AT MsK
INSTALL CM PROCEDURES AND DATA LINK
DESIGN DEVELOP HW & SW MODIFICATIONS
DESIGN DEVELOP SW MODIFICATIONS
DEVELOP UNIT TRAINING MATERIALS BDM
REQUIREMENTS DESIGN TIM & SCENARIO REVIEW
GOVERNMENT REVIEW OF SCENARIO PACKAGE
REFINE SCENARIO PACKAGE & FINALIZE
INTEGRATION AT WDL
DEVELOP STAFF TRAINING MATERIALS
PREPARE HW/SW MODIFICATIONS DOCUMENT DRAFT
BDM DEVELOP DETAILED TEST PLAN FINAL TASK 2.1
SIMULATORS AVAIL
MODIFY M1 SIMULATORS
PREPARE HW/SW MODIFICATION DOCUMENT FINAL
HW/SW INTEGRATION AT CCTB
CONDUCT STAFF TRAINING
BDM CONDUCT HW/SW FUNCTIONAL TESTING
TRR TIM
CONDUCT PRELIMINARY TRIALS TASK 2.7
BDM REFINE & FINALIZE TRAINING PACKAGE
CONDUCT TEST TASK 2.8
DATA REDUCTION
DATA ANALYSIS
PREPARE DRAFT REPORT
PREPARE FINAL REPORT
DAVE EXT:37340

VIDS

Sponsor/POC	PM-Survivability/Brad McNett	**Phone**	(313) 574-7640
STRICOM POC	Rick Copeland	**Phone**	(407) 381-8702
Loral POC	Bob Marraccini	**Phone**	408) 473-5041
Funding Source	PM-SURVIVABILITY, DCD, DARPA		
Schedule:	**Start** 22 April 1992 (Step 1)	**Stop**	22 July 1992

Project Description:

VIDS is an experiment designed to provide a relatively low-cost and rapidly deployed BDS-D simulation platform, to facilitate the conduct of simulated threat engagements, in order to evaluate the operational effectiveness and suitability of various electronic survivability suites of sensors and countermeasures. The overall project goal is to provide PM-SURVIVABILITY and DCD (Armor School), data to review and use to revise their survivability requirements in areas such as: type of response given specific threats, response times per specific threat, angles of attack to be protected from, and multiple attack situations. The results of BDS-D testing will be compared to similar VIDS tests being conducted under the TACOM VIDS program (LTV is the prime contractor). This combined approach will provide quantitative measures of survivability effectiveness, and provide a platform for training Army Armored personnel in tactics, techniques and procedures relative to usage of VIDS equipment on armored combat vehicles.

The VIDS DO has two steps: Step 1 to develop a Feasibility Analysis Report and a proposal for Step 2. Step 2 is to be implemented in two phases: Phase 1 to develop the basic BDS-D VIDS platform, using the M1A1 vehicle and three specific sensor/countermeasures (Missile Countermeasure Device, Laser Warning Receiver and Missile Warning System), with corresponding documentation and test activities. Phase 2 to develop additional suites of survivability equipment to be later specified.

Project Status:

Final version of the BDS-D VIDS Feasibility Analysis Report and Step 2 proposal were delivered on 22 July. Step 1 is complete. the Step 2, Phase 1 award is expected no later than September 1992.

LORAL

THREAT	SENSOR	COUNTERMEASURES
Range Finder Laser detected from indeterminate source	• High Accuracy Laser Warning Receiver	• Counterfire • ROS and/or ORS
Helicopter detected by acoustic signature. Hostile/friendly differentiation possible	• Non-Imaging System	• ROS and/or ORS
Assault platform detected by own active radar. Classification and Hostile/friendly differentiation	• Future Armored System Radar	• Counterfire • ROS and/or ORS
Detected Unknown upgraded to Hostile	• Identification Friend/Foe	• Counterfire • ROS and/or ORS
Search or Tracking radar detected from indeterminate source	• Tank Radar Warning Receiver	• Counterfire • Advanced Threat Radar Jammer • ROS and/or ORS
Mines	• Mine Detector	• Veh. Magnetic Signature Duplication
SCUD-B - Dangerous chemical and/or radiation levels present	• Nuclear/Chemical Sensor	• NBC Overpressure System
Large caliber gun fire	• Muzzle Flash Detector • Threat Countermeasure System	• Threat Countermeasure System • Combat Protection System • Counterfire • ROS and/or ORS
ATGM AT-2C RF Uplink	• Missile Warning Sensor • Tank Radar Warning Receiver • Threat Countermeasure System	• Missile Countermeasure Device • Threat Countermeasure System • Combat Protection System • Counterfire • Chaff/Flares • ROS and/or ORS
ATGM AT-4 Wire	• Missile Warning Sensor • Threat Countermeasure System	• Missile Countermeasure Device • Threat Countermeasure System • Combat Protection System • Counterfire • Chaff/Flares • ROS and/or ORS
ATGM AT-6 RF Uplink	• Missile Warning Sensor • Tank Radar Warning Receiver • Threat Countermeasure System	• Missile Countermeasure Device • Threat Countermeasure System • Combat Protection System • Counterfire • ROS and/or ORS
ATGM AT-9 Laser Homing	• Missile Warning Sensor • Laser Warning Receiver • Threat Countermeasure System	• Laser Countermeasure Device • Threat Countermeasure System • Combat Protection System • Counterfire • ROS and/or ORS
ATGM AT-11 Laser Beam Rider	• Missile Warning Sensor • Laser Warning Receiver • Threat Countermeasure System	• Threat Countermeasure System • Combat Protection System • Counterfire • ROS and/or ORS

Objective

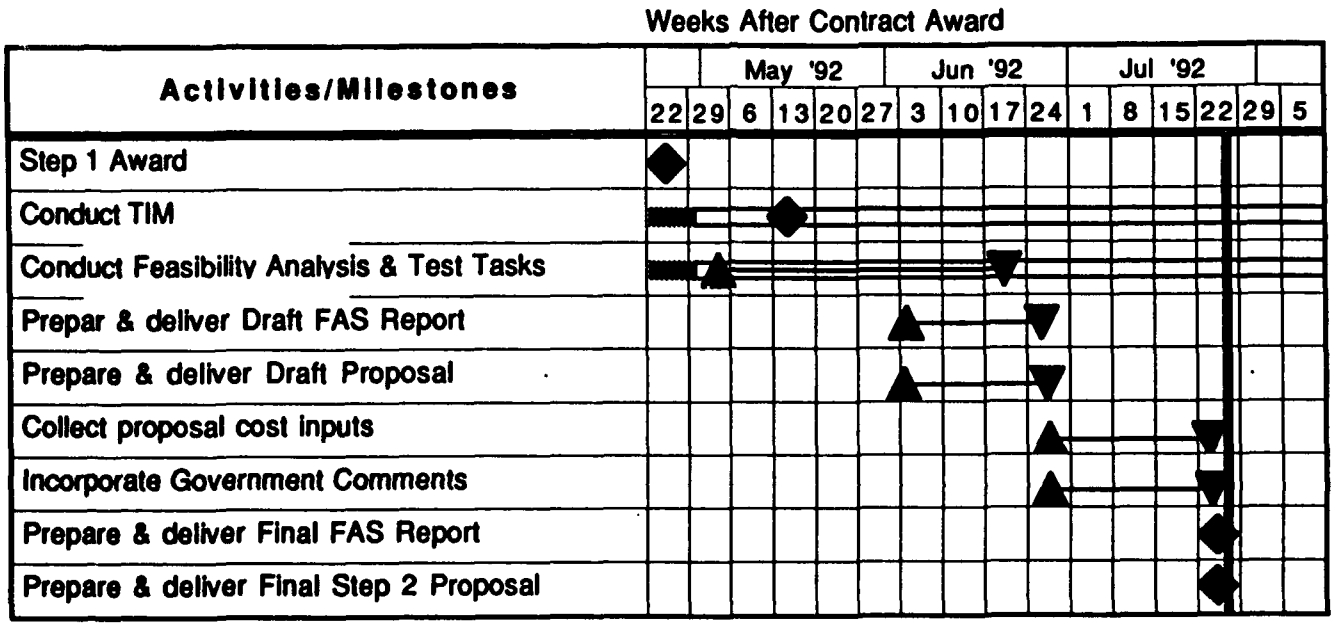
• VIDS BDS-D primary objectives is to provide PM-SURVIVABILITY and DCD (Armor School), data to review and use to revise their survivability requirements in areas such as:

1. Type of response given specific threats
2. Response times per specific threat
3. Angles of attack to be protected from
4. Multiple attack situations.

• In addition, to evaluate BDS-D capability to support VIDS-like experiments.

LORAL

BDS-D VIDS STEP 1 SCHEDULE



3 ACRONYM LIST

ARDEC	Army Research, Development and Engineering Center
ADST	Advanced Distributed Simulation Technology
AHM	Anti-Helicopter Mines
AI	Artificial Intelligence
AIT	Air Intercept Trainer
ARI	Army Research Institute
ARO	After receipt of order
ATAC	Air to Air Combat
ATD	Advanced Technology Demonstration
ATES	Automatic Threat Engagement Simulator
ATHS	Automatic Target Handoff System
ATTD	Advanced Technology Transition Demonstration
AVSCOM	Army Aviation Systems Command, St. Louis
AWACS	Airborne Warning and
BDS-D	Battlefield Distributed Simulation-Development
Bn	Battalion
CAC	U. S Army Combined Arms Center
CAU	Cell Adapter Unit
CD	Combat Developments
CCP	Contract Change Proposal
CCTB	Close Combat Test Bed
CGF	Computer Generated Forces
CGSC	Command and General Staff College, Ft. Leavenworth
CITV	Commander's Independent Thermal Viewer
CIU	Cell Interface Unit
CSRDF	Crew Station R&D Facility
DARPA	Defense Advanced Research Projects Agency
DB	Database
DCD	Director of Combat Development
DIS	Distributed Interactive Simulation
DO	Delivery Order

DOD	Department of Defense
DOIM	Directorate of Information Management
DOTD	Directorate of Training and Doctorate
DUSA-OR	Deputy Under Secretary for the Army for Operations Research
ECS	Exercise Control Station
EW	Electronic Warfare
FAS	Feasibility Analysis Study
FBL	Future Battle Labs
FWA	Fixed Wing Aircraft
FY	Fiscal Year
GCI	Ground Control Intercept
GFE	Government Furnished Equipment
GPSE	Gunners Primary Sight Extension
GPS	Gunners Primary Sight
HEL	Human Engineering Lab
HOM	Higher Order Models
HQ	Headquarters
HW	Hardware
ICD	Interface Control Documents
IDA	Institute for Defense Analysis
IEI	Illusion Engineering, Inc.
IG	Image Generator
IPR	In Process Review
IRAD	Internal Research and Development
IST	Institute of Simulation & Training
ITV	Independent Thermal Viewer
IVIS	Inter Vehicular Information System
JDF	Joint Development Facility
JMASS	Joint Modeling and Simulation Systems
KAPTAN	Knowledge Acquisition Prototype Testbed Aerospace Node
LAN	Local Area Network
LDC	Leader Development Center

LSFBD	Land Systems Future Battlefield Design
LSE	Laboratory Sustaining Effort
LWDL	Loral Western Development Labs
LOSAT	Line-of-Site, Antitank
MCC	Management Command & Control
MDRC	McDonnell Douglas Reconfigurable Cockpit
MODSIM	Modular Simulator
MULTIRAD	Multiship Research and Development
NTSC	Navy Training Systems Center
NIU	Network Interface Unit
NLOS	Non line of site
NTE	Not To Exceed
OPTEC	Operational Test and Evaluation Command
PEO	Program Executive Office
POC	Point of Contact
POSNAV	Position Navigation
PDU	Protocol Data Unit
PMO	Program Management Office
PM NLOS	Project Manager, Non-Line-of-Site
POI	Program of Instruction
RAH-66	Reconnaissance Attack Helicopter "Comanche"
RDB	Red Design Bureau
ROM	Rough Order of Magnitude
RPA	Rotorcraft Pilot Associate
RWA	Rotary Wing Aircraft
SAFOR	Semi-Automated Forces
SAMS	Schools of Advanced Military Training
SIMNET	Simulation Network
SMI	Soldier Machine Interface
SMS	Smart Minefield Simulator
SPECS	Specifications
ST	Stream Two
SW	Software

STRICOM	Simulation, Training and Instrumentation Command
TACOM	U.S. Army Tank and Automotive Command
TBD	To Be Decided
TEC	Topographic Engineering Center
TIM	Technical Interchange Meeting
TIS	Thermal Imagery Sight
TOC	Tactical Operations Center
TRAC	TRADOC Analysis Command
TRADOC	U.S. Army Training and Doctrine Command
TSM-AT	TRADOC Systems Manager for Anti Tank
TTP	Tactics, Techniques and Procedures
USAAVNC	U. S. Army Aviation Center
VV&A	Verification, Validation and Accreditation
VIDS	Vehicle Integrated Defense Systems
WAMS	Wide Area Mines
X-ROD	Experimental AT Missile